ORIGINAL

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES & ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER

RECEIVED
JUN 13 2008

APPLICATION FOR PERMIT TO CONSTRUCT ACROSS OR ALONG A STREAM AND / OR WATER QUALITY CERTIFICATION

Chapter 151 of the Kentucky Revised Statutes requires approval from the Division of Water prior to any construction or other activity in or along a stream that could in any way obstruct flood flows or adversely impact water quality. *If the project involves work in a stream, such as bank stabilization, dredging or relocation, you will also need to obtain a 401 Water Quality Certification (WQC) from the Division of Water.* This completed form will be forwarded to the Water Quality Branch for WQC processing. The project may not start until all necessary approvals are received from the KDOW. For questions concerning the WQC process, contact John Dovak at 502/564-3410.

If the project will disturb more than 1 acre of soil, you will also need to complete the attached Notice of Intent for Storm Water Discharges, and return both forms to the Floodplain management Section of the KDOW. This general permit will require you to create and implement an erosion control plan for the project.

1. **OWNER:** Kentucky Transportation Cabinet, Division of Environmental Analysis c/o Danny Peake A# 18592
   Give name of person(s), company, governmental unit, or other owner of proposed project.
   MAILING ADDRESS: 200 Mero Street, 5th Floor
   Frankfort, Kentucky 40622
   TELEPHONE #: 502-564-7250 **EMAIL:** Danny.Peake@ky.gov

2. **AGENT:**
   Give name of person(s) submitting application, if other than owner.
   ADDRESS:
   TELEPHONE #: **EMAIL:**

3. **ENGINEER:** T.H.E. Engineers, Inc. **P. E. NUMBER**
   Contact Division of Water if waiver can be granted
   TELEPHONE #: 859-263-0009 **EMAIL:**

4. **DESCRIPTION OF CONSTRUCTION:** Restoration of a stream known as Town Branch, a tributary of Strodes Creek
   Describe the type and purpose of construction and describe stream impact
   in Clark County. This project will involve restoration along 5862' of Town Branch, resulting in 7054' of stream with a riparian zone. This is to be used as a mitigation "bank" for future KYTC projects. One 275' section of stream is privately owned and will not be altered. See map for that location. It should be noted that not all of the existing 5862' will be filled, but left as remnant channels that will function as aquatic and wildlife habitat.

5. **COUNTY:** Clark **NEAREST COMMUNITY:** Winchester

6. **USGS QUAD NAME:** Austerlitz **LATITUDE/LONGITUDE:** N38-01-48, W84-11-40 (project end)

7. **STREAM NAME:** Town Branch **WATERSHED SIZE (in acres):** 2611

8. **LINEAR FEET OF STREAM IMPACTED:** 5862' (although segments of the existing channel will not be filled)

9. **DIRECTIONS TO SITE:** Traveling east on I-64 towards Winchester, take Exit 96 onto KY627 (Paris Road) heading towards Paris. Travel approximately 0.7 miles from the beginning of the off ramp to the first road entrance to the left. This will be Fortune Drive. Take the first left off Fortune Drive and stay on this road as it takes you back west along I-64. You will pass over a railroad and take an unimproved road on the right hand side before the road crosses a stream. This road will take you down to a stream, cross it and you will be near the upstream limit of the project.

10. **IS ANY PORTION OF THE REQUESTED PROJECT NOW COMPLETE?** ☐ Yes ☑ No If yes, identify the completed portion on the drawings you submit and indicate the date activity was completed. DATE _____

11. **ESTIMATED BEGIN CONSTRUCTION DATE:** Spring 2009

12. **ESTIMATED END CONSTRUCTION DATE:** Summer 2009

13. **HAS A PERMIT BEEN RECEIVED FROM THE US ARMY CORPS OF ENGINEERS?** ☐ Yes ☑ No If yes, attach a copy of that permit.

14. **THE APPLICANT MUST ADDRESS PUBLIC NOTICE**

(a) X **Public notice in newspaper having greatest circulation in area (provide newspaper clipping or affadavit)**

____ **Adjacent property owner(s) affadavits (Contact Division of Water for requirements.)**

(b) ____ **I REQUEST WAVER OF PUBLIC NOTICE BECAUSE:**

_____

Contact Division of Water for Requirements.

15. **I HAVE CONTACTED THE FOLLOWING CITY OR COUNTY OFFICIALS CONCERNING THIS PROJECT:**
Ken Kerns, City Manager of Winchester; Vernon Azevedo, WMU
Give name and title of person(s) contacted and provide copy of any approval city or county may have issued.

16. **LIST OF ATTACHMENTS:** Location map, mitigation report, plan and profile sheets, and flood study.
List plans, profiles, or other drawings and data submitted. Attach a copy of a 7.5 minute USGS topographic map clearly showing the project location.

17. **I, KEN KERNS (owner) CERTIFY THAT THE OWNER OWNS OR HAS EASEMENT RIGHTS ON ALL PROPERTY ON WHICH THIS PROJECT WILL BE LOCATED OR ON WHICH RELATED CONSTRUCTION WILL OCCUR (for dams, this includes the area that would be impounded during the design flood).**

18. **REMARKS:** _____

I hereby request approval for construction across or along a stream as described in this application and any accompanying documents. To the best of my knowledge, all the information provided is true and correct.

SIGNATURE: _____
Owner or Agent sign here. (If signed by Agent, a Power of Attorney should be attached.)

DATE: 6/12/2008

SIGNATURE OF LOCAL FLOODPLAIN COORDINATOR:

_____
Permit application will be returned to applicant endorsed by the local floodplain coordinator.

DATE: 5/29/08

SUBMIT APPLICATION AND ATTACHMENTS TO:

Floodplain Management Section
Division of Water
14 Reilly Road
Frankfort, KY 40601

CLARK COUNTY, KY.
KYTC & CITY OF WINCHESTER
TOWN BRANCH STREAM RESTORATION

HYDRAULIC ANALYSIS METHODS

At the request of the Kentucky Transportation Cabinet (KYTC), THE Engineers, Inc., in cooperation with the City of Winchester (City) and the Winchester Municipal Utilities (WMU), evaluated the existing flooding effects on a portion of Town Branch and Tributary T3 of Town Branch. Additionally, the same area was evaluated for any increase or decrease in flooding associated with a proposed natural channel design being pursued by KYTC, the City, and WMU. The Federal Emergency Management Agency's (FEMA) guidelines for revising existing flood insurance studies (FIS) were followed for this analysis. Town Branch was studied beginning 700' upstream of its confluence with Strodes Creek and ending approximately 8700' upstream (1200'upstream of the arch culvert over Town Branch at the Louisville and Nashville Railroad). Tributary T3 of Town Branch was studied beginning at its confluence, approximately 7300' upstream of Town Branch's confluence with Strodes Creek, and ending approximately 850' further upstream.

Flood studies for the existing streams were completed and published December 4, 1986 by FEMA as shown in the Clark County, Kentucky FIS (Community Number 210278). Review of the FIS showed that four cross sections with data were published within the study area of Town Branch and one cross section was available within the study area of Tributary T3. In an attempt to obtain a copy of the original hydraulic runs on which the FIS was based, THE Engineers, Inc. contacted Michael Baker, Jr., Inc. (FEMA's warehousing contractor) and the Kentucky Division of Water-Water Resources Branch. Both agencies replied that existing hydraulic data using HEC-2 was no longer available.

Since the original study data (HEC-2 runs) were not available, THE Engineers, Inc., had a survey performed to provide a detailed terrain model and cross sections of the study area in order to perform hydraulic computations using HEC-RAS. Standard surveying procedures were used with all elevations tied to NAVD-1988 datum. Forty-nine cross sections were used along Town Branch, and five cross sections were used along Tributary T3, to model the existing flooding conditions within the study area. Cross sections used to model Town Branch at the railroad arch culvert, the stream above the culvert, and cross section on Tributary T3, were field surveyed. All other cross sections were taken from the digital terrain model using CADD procedures of Microstation and Inroads by Bentley. Further review of the FIS indicated discharge information for flood data was not published at appropriate locations for the study reaches and additional information was not available from FEMA. The Division of Water's Floodplain Management Section was consulted. It was determined that discharges for the 2 year, 10 year, 50 year, 100 year and 500 year return intervals, found on the USGS – Hydrology of Kentucky web site, could be used to evaluate flooding

effects along Town Branch and Tributary T3 for this study. Discharge data obtained from the web site is shown in Table 1 below.

Table 1: Flood Discharges found at KYGEO.KY.GOV-KYHYDRO-Main

	Q2	Q10	Q50	Q100	Q500
Town Branch Above Tributary T3	334.1	658.9	993.7	1146.0	1520.9
Town Branch Below Tributary T3	376.8	741.5	1116.3	1286.3	1704.6
Tributary T3 at mouth	95.8	193.1	296.8	345.2	465.3

Manning roughness coefficients were field evaluated for the analysis and assigned the values indicated in Table 2. HEC–RAS (Version 3.1.3) was used to re-model the existing flooding conditions along Town Branch and Tributary T3 for comparison with information in the existing published flood data generated using HEC-2. Starting water surface elevations for each discharge were found by using the energy slope method of HEC–RAS assuming subcritical flow. FIS data generated using NAVD–1929 datum was converted to NAVD–1988 datum for comparison purposes.

Table 2: Manning Roughness Coefficients for existing conditions.

	Channel (n)	Overbank (n)
Town Branch	0.035 – 0.045	0.05 – 0.09
Tributary T3	0.038	0.055

Natural channel design methods developed by Dave Rosgen were used to establish a new stream alignment that will be elevated above bedrock, with bankfull cross sectional areas and stream profile designed to transport the bedload moving through the watershed. Cross sections for the proposed stream were generated using CADD techniques from the proposed alignment and inserted into HEC–RAS. The proposed cross sectional information was tied to the existing flood study HEC–RAS analysis by placing undisturbed reach data upstream and downstream of the project area into the proposed flood analysis. Within the proposed channel reach, ineffective flow areas were eliminated in the HEC–RAS analysis from areas within the existing channel that will be abandoned. Eliminating these areas from the analysis generated a conservative hydraulic analysis due to reduction of available conveyance. Discharges found for the existing

conditions were utilized for the proposed condition since overall watershed characteristics were not affected. Manning roughness coefficients for the proposed condition were estimated, taking into consideration that future overbank conditions would have a fully developed riparian zone. Estimated roughness coefficients are shown in Table 3 for the proposed stream. Starting water surface elevations found for each return interval in the existing HEC–RAS analysis were used in the proposed analysis since the hydraulic analysis starts in an undisturbed section of Town Branch. The proposed new floodplain data was then compared to the existing FEMA floodplain data.

Table 3: Manning Roughness Coefficients for proposed conditions.

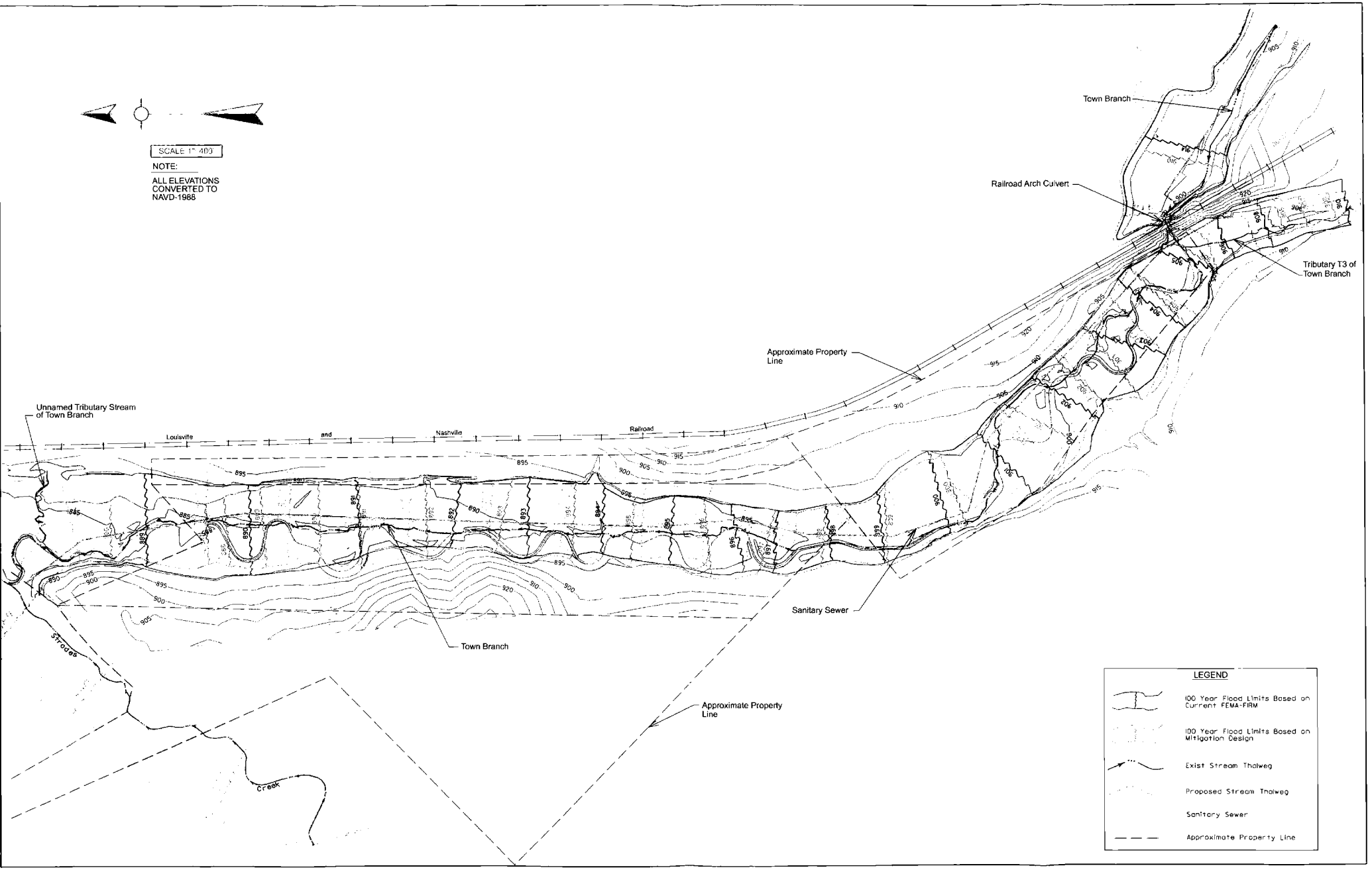
	Channel (n)	Overbank (n)
Town Branch In Channel Restoration Area	0.035	0.065 – 0.07
Tributary T3	0.038	0.055

RESULTS OF STUDY

Plan views and profiles of the re-modeled existing flooding condition, and the proposed condition, were generated. A copy of the plan view 100-year analysis is submitted for review, showing the existing FEMA map, the revised "existing condition", and the proposed condition. The re-modeled existing conditions compare favorably with the published flood study, indicating a good baseline was initially established.

Comparison of the new baseline flood conditions with the post-project flood conditions is easier accomplished utilizing the plan view provided (since the proposed stream is much longer than the existing stream, a direct comparison of profiles is difficult). As indicated on the plan view, the flood levels are essentially unchanged throughout the entire reach studied. Because the project area is located within a perpetual conservation easement, no future filling or other construction is foreseeable beyond the restoration work. Therefore, it was deemed that a floodway delineation was not needed.

Only the 100-year flood analysis is submitted, but if needed, the Q2, Q10, Q50, and Q500 can be provided.


SCALE 1" 400'
NOTE:
ALL ELEVATIONS CONVERTED TO NAVD-1988
Town Branch
Railroad Arch Culvert
Tributary T3 of Town Branch
Approximate Property Line
Unnamed Tributary Stream of Town Branch
Louisville and Nashville Railroad
Sanitary Sewer
Town Branch
Approximate Property Line
Strodes Creek
LEGEND
100 Year Flood Limits Based on Current FEMA-FIRM
100 Year Flood Limits Based on Mitigation Design
Exist Stream Thalweg
Proposed Stream Thalweg
Sanitary Sewer
Approximate Property Line

The Winchester Sun

Classified

NOTICES

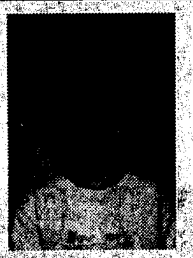
Foster Parents Needed
Are you interested in supporting youth between the ages of 8 and 15? If so please give us a call. We offer flexible training, competitive reimbursement twice per month, weekly case management and 24 hour crisis support. Call Crystal or Tesha to get more information
859-264-8796

HOW TO REACH US IF YOU MISS YOUR

WINCHESTER SUN

CALL CIRCULATION 744-3880

Between 6pm-7pm weekdays, Saturday Mornings 7:30am- 8am



Congratulations

Rebecca Grace Hutchinson

Kindergarten Grad

Love, Grammy & Grampy

5009

MAN'S BEST FRIEND

Look to the classifieds for cuddly friends just waiting to become a part of your family. Supplies and pet service listings, too!

CALL CLASSIFIEDS
744-SALE
The Winchester Sun

Congratulations
Mason Kidd
on your Kindergarden Graduation! Good Luck in 3rd Grade

Public Notice

LEGAL PUBLIC NOTICE

The following titled ordinance was given a second reading and adopted by the Clark County Fiscal Court, Winchester, Kentucky, at its regular meeting commencing at 9:30 a.m., Wednesday, May 28, 2008, in Room 107, Clark County Courthouse, Winchester, Kentucky.

AN ORDINANCE AMENDING ORDINANCE NO. 89-3 RELATING TO AN ENHANCED 911 EMERGENCY TELEPHONE SERVICE WITHIN CLARK COUNTY, KENTUCKY.

A copy of the full text of said ordinance is available for public inspection in the Office of County Judge/ Executive Henry Branham, Room 103, Winchester, Kentucky, during the hours of 8:00 A.M. and 4:00. P.M. Monday through Friday.

Clark County Fiscal Court
Henry Branham
County Judge/ Executive
June 2, 2008

Public Notice

LEGAL PUBLIC NOTICE

Notice is hereby given that the Kentucky Transportation Cabinet has filed an application with the Natural Resources and Environmental Protection Cabinet to restore/rehabilitate 5862 feet of streem on property owned by the City of Winchester. The project will result in 7054 feet of stream created, based on a natural stream design methodology. The project is located one mile northwest of the I-64 and KY627 intersection, on Town Branch; a tributary to Strodes Creek. The project is a joint effort with the Strodes Creek Conservancy and the City of Winchester. Any comments or objections concerning this application shall be directed to: Kentucky Division of Water, Water Resources Branch, 14 Reilly Road, Frankfort Office Park, Frankfort, Kentucky 40601. Phone: (502) 564-3410.

June 2, 2008

Public Notice

LEG
B

A public hearing will be City Hall on June 17, 200 Commission meeting) for comments of citizens regar Local Government Econ upcoming fiscal year.

Estimated balance carried

Anticipated receipts

Anticipated miscellaneous

Anticipated interest incom

Total Resources Available f Appropriation

PUBLIC INSPECTION: Aid and Local Governme available for public inspec during regular business ho

All interested persons an invited to the public hearir proposed uses of the M Economic Assistance Prog

Any person(s) who can public hearing, but wish Manager, 744-2821, so tha comments.

WHO U GO

For Details Call...
Vickie 355-1233 or Angela 355-1209
or The Sun 744-7253.

The Winchester Sun Classified

SERVICES | YARD SALES | EMPLOYMENT | REAL ESTATE | RENTALS | AUTOMOTIVE | MERCHANDIS

20 Wall Street
Winchester, Kentucky 40391
PO Box 4300, Winchester, KY 40392
FAX: 859-745-0638
E-mail: vjohnson@winchestersun.com or ahaddix@winchestersun.com

See o
addit

Misc. Items

Public Notice

LEGAL PUBLIC NOTICE

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Great Job, Sierra on Graduating 5th grade!

We're proud of you!
Dad, Kelly, Alyssa, Cody, Mamaw & Pappa

The Winchester Sun Classifieds

Misc. Items

King sized bedroom suit w/ matresses, solid wood, w/ wrought iron canopy, dresser w/ mirror, armoire and nightstand, asking $1800, sofa and loveseat with accent pillows, asking $600, Whirpool washer and dryer, 1yr old, excellent cond, $500, dining room suit, with lighted hutch, exc cond, asking $1500, 771-4950/771-0566

New Subscriptions for The Winchester Sun

Delivered to your home 6 days a week for only

$10.00 month.

LOCAL SUBSCRIPTIONS ONLY

744-3880

New Customers Pay with your credit/debit card today & receive 4 months for the price of 3. Mon-Fri 8am-8pm

Top Soil, you haul, $25 a load, also wood working tools. 771-0661 or 595-4992

Produce

Tomato plants 111 Waveland Ave. (Forest Park) 8 varieties $2 a dozen. 771-7022

? WANTED

Wanted to Buy

Buying Gold & Silver, also silver coins, 1964 & earlier, paying best prices in area guaranteed. Rankin Paynter, across from Lowes 1200 C Bypass Rd 771-0064

Junk Cars Wanted, we pay $75- $250 call 859-327-7499

Bidder Card

HOW TO REACH US IF YOU MISS YOUR

WINCHESTER SUN

CALL CIRCULATION 744-3880

Between 6pm-7pm weekdays, Saturday Mornings 7:30am- 8am

CITY SUBSCRIBERS

*We'll deliver one to you.

COUNTY SUBSCRIBERS

*We'll have your carrier bring the missed paper the following evening.

Found

Found near Clark/Montgomery county line, white female Great Pyranese, very friendly, 859-595-2573

Small breed dog in Calmes area please call 859-771-5047 to indentify

Free

7 wk old kittens, litter trained, 3 male, yellow, to a good home call 744-0725 after 5pm

Daniel L. and Summer Bowens please contact Kathy at 859-744-2813

Free 18 mo old wire haired pup, crate trained, house broken, hyper, needs yard to run good with kids, call 402-8538

Free Camper top for a pick up truck, located at 157 Mimosa Dr. Call 745-6540

Free to good home, adorable kittens, 2 male, 2 female, 8 wks old, call 744-7925

Free to good home, kittens, 2 are Bob Tail, call 859-595-6583

Free-3 black kittens, litter trained, approximately 8 wks old, all male, call 737-3772

Yard Sale

Winn Ave 240
Ark of Mercy
Fri 9-?
Lots of new items, Victorias Secret, smoker, name brand clothes, Coach purse, Home interior, childrens clothes, adult clothes, plus sizes, misc

Public Notice

LEGAL PUBLIC NOTICE

Pursuant to City Ordinance No. 922, the following corporation/individual has made application for a Private Club License.

E.F.I.N. Good Inc.
dba
Big Easy Grill
836 ByPass Road
Winchester, KY 40391

Any person or persons desiring to oppose the issuance of this license are required to file a written protest in the office of the City Clerk within 10 days of publication of last intent.

WINCHESTER LICENSING BOARD
Marshall DeShields
Roy Hudson
Charles Kennedy
Police Chief William M. Jackson, II
June 4, 5, 2008

Public Notice

LEGAL PUBLIC NOTICE

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June 2, 2008

Public Notice

LEGAL PUBLIC NOTICE

Roxanna C. Otis, 1501 Ford Rd., Winchester, KY 40391, hereby declares her intention to apply for a

Public Notice

LEGAL PUBLIC NOTICE
CLARK CIRCUIT COURT
CIVIL BRANCH
DIVISION II

CASE NO. 07-CI-00254

THE BANK OF NEW YORK AS TRUSTEE FOR THE CERTIFICATE HOLDERS CWALT, INC. ASSET-BACKED CERTIFICATES, SERIES 2004-28CB — PLAINTIFF

VS.

NOTICE OF MASTER COMMISSIONER'S SALE

PAUL F. BELLAMY and SHANNON C. BELLAMY, his wife — DEFENDANTS

* * * * * * * * * * * * *

Pursuant to Judgment and Order of Sale entered in the above styled action on May 16, 2008 and in order to raise the sum of $172,257.95 plus interest, attorneys fees and costs as provided in said Judgment, the undersigned will offer for sale, at public auction, the following described real property, to-wit:

A certain house and lot on the west side of South Maple Street bounded and described as follows, to-wit: Beginning at a stake in the west margin of Maple Street corner to Miss Georgia Boston (formerly Mrs. Tracy Gamboe); thence with the west margin of said street in a southern direction 54 feet to a stake corner to a vacant lot of Mrs. Tracy M. Gamboe; thence departing from said Maple Street and perpendicular to same in a western direction with Mrs. Gamboe's line 150 feet to an alley; thence with the East margin of said alley, north 54 feet to a corner of Miss georgia Boston (formerly Mrs. Tracy M. Gamboe,; thence departing from said alley with a line of Miss Georgia Boston in an eastern direction 150 feet to the beginning; the improvements thereon being known and designated as 542 South Maple Street, Winchester, Kentucky;

Being the same property conveyed to PAUL F. BELLAMY and SHANNON C. BELLAMY, his wife, by Virginia C. Wood, a widow, by deed dated September 28, 2001 and of record in Deed Book 385, Page 178, in the Office of the Clerk of the Clark County Court.

Property is known as 542 South Maple Street, Winchester, Kentucky 40391.

THE SALE WILL BE CONDUCTED AT 11:30AM ON WEDNESDAY, June 11, 2008 AT THE FRONT DOOR OF THE CLARK COUNTY COURTHOUSE, WINCHESTER, KENTUCKY.

Said property shall be sold to the highest and best bidder upon the following terms:

1. The purchaser shall be required to pay the sum of ten percent (10%) down in cash at the time of the sale. In the event the Plaintiff is the purchaser, the Plaintiff shall not be required to make a down payment, but the down payment shall be credited against its mortgage.
2. The balance of the purchase price shall be paid on a credit of sixty (60) days at the lawful rate of twelve percent (12%) per annum. The purchaser shall be required to execute a bond or bonds with sufficient surety thereon for said balance which shall have the force and effect of a judgment in order to secure the payment of the balance of the purchase price, and said bond shall constitute a lien on the said property until paid.
3. All delinquent property taxes shall be paid from the proceeds of the sale. The purchaser shall be required to assume and pay all ad valorem taxes assessed against by the County of Clark and State of Kentucky for the current year and subsequent years.
4. Any purchaser or purchasers shall have the privilege of paying all or any portion of the purchase price or paying said bond or bonds before maturity by paying the principal thereof together with all accrued interest thereon.
5. Said property shall be sold free and clear of the claims of all parties to the within action and of all liens and encumbrances, including all past due taxes except for restrictions and easements appearing of record in the Clark County Clerk's Office.
6. The risk of loss shall pass to the purchaser upon confirmation of sale.

M. ALEX ROWADY,
MASTER COMMISSIONER
CLARK CIRCUIT COURT
May 21, 28, 2008
June 4, 2008

4087

Public Notice

LEGAL PUBLIC NOTICE
CLARK CIRCUIT COURT
CIVIL BRANCH
DIVISION I

CASE NO. 07-CI-00177

JPMORGAN CHASE BANK, N.A. fka JPMORGAN CHASE BANK sbmt BANK ONE, N.A. — PLAINTIFF

VS.

NOTICE OF MASTER COMMISSIONER'S SALE

RONALD K. SMITH; CONNIE S. SMITH nka CONNIE BREWER; and KENTUCKY BANK — DEFENDANTS

* * * * * * * * * * * *

Pursuant to Judgment and Order of Sale entered in the above styled action on May 9, 2008 and in order to raise the sum of $18,403.46 plus interest, attorneys fees and costs as provided in said Judgment, the undersigned will offer for sale, at public auction, the following described real property, to-wit:

A certain house and lot of land lying and being on the West side of Kentucky Street, in

Mitigation Plan
for the
Town Branch Advance Mitigation Site
Clark County, Kentucky

A Partnership of the

Kentucky Transportation Cabinet
City of Winchester
and the
Strodes Creek Conservancy

May 2008

Mitigation Plan
For Town Branch Site
Clark County, Kentucky

Introduction

The City of Winchester (City) proposes to restore a 76-acre parcel in Clark County, Kentucky (Exhibit 1) in partnership with the Kentucky Transportation Cabinet (KYTC) and the Strodes Creek Conservancy (SCC). The site includes approximately 5862 linear feet of existing degraded stream. This partnership will assist KYTC with meeting its stream mitigation needs in the Licking River watershed and provide the City with sufficient funding to restore the parcel's streams and address water quality concerns on Strodes Creek. Strodes Creek is identified as an impaired stream in the Division of Water's Clean Water Act (CWA) Section 303(d) report. The Strodes Creek Conservancy is currently undertaking several stream and wildlife habitat improvement projects in the Strodes Creek watershed.

Any stream mitigation credits that are derived as a result of the proposed restoration activities on Town Branch will belong to KYTC. Use of those credits by KYTC will be determined by U.S. Army Corps of Engineers, Louisville District (Corps) and the Kentucky Division of Water (KDOW) for unavoidable impacts to jurisdictional waters in the Licking River basin that are permitted by the Corps and/or KDOW.

Section 1: Baseline Information

I. Proposed Impact Site:

A proposed impact site is not associated with this advance mitigation site. The mitigation site is being developed independently by the City and SCC in partnership with KYTC to address KYTC's stream mitigation needs in the Licking River basin. The Corps will determine if use of the site for unavoidable impacts in the Licking River basin is allowed and the mitigation rates applied. Therefore, no further consideration of a proposed impact site will be included in this plan.

II. Proposed Mitigation Site:

A. *Mitigation Concept and Purpose*

This project is intended to restore a degraded stream on an 80-acre parcel in Clark County, Kentucky, that includes approximately 5862 linear feet of existing, degraded stream channel, so that any available mitigation credits are provided to KYTC. The existing stream location is shown on Exhibit 2 (A & B), and the conceptual mitigation plan is shown on Exhibit 3 (A & B).

B. *Ownership*

The City owns the site. The City and SCC plan to jointly manage the site after completing the project. SCC has an executed agreement, for a conservation easement, with the City for the mitigation site to ensure permanent protection of the property.

C. *Location*
The site is located near the City of Winchester, in Clark County, Kentucky. It lies north of Interstate 64, and west of KY 627. Coordinates for the site are latitude N38-01-48, longitude W84-11-40. The site lies on the Austerlitz, Kentucky USGS Quadrangle within the Strodes Creek watershed. Strodes Creek is a tributary of Stoner Creek, which flows to the South Fork of the Licking River and part of the 05100102 8-digit HUC. Exhibit 1 contains a vicinity map for the site, showing its location relative to Winchester and major roads.

D. Habitat Classification
Although the stream appears to have been partially channelized in the past, the channel dimensions and sediment analysis fit those of Rosgen C4 type channel.

E. Existing Conditions
Town Branch is a perennial tributary to Strodes Creek. The existing stream is considered entrenched, with near vertical banks in portions of the upper reach. Overall, it has a low sinuosity, especially evident in the lower reach where the stream parallels a railroad. The stream may have been straightened in the past to facilitate agricultural needs, construction of the railroad, or installation of a sewer line. The presence of a bedrock channel bottom in most of the stream causes lateral erosion and overwidening of the bankfull channel. The bankfull channel width varies from 21 to 37 feet; with an average width of 29 feet. The stream has a mild slope of 0.003 ft/ft, with the upper reach being primarily riffle/runs and the lower reach being more of a riffle/pool complex. The entrenchment ratio, width to depth ratio, and floodprone width vary erratically throughout the stream, which indicates the current condition of the channel is unstable. There are stream segments where active erosion or deposition is evident. The riparian zone is very limited along most of its length; with few trees and areas being in grasses to near the top of bank. Although an industrial park is being developed on adjoining property, it will not threaten the site. The site is currently in pasture and used for the production of hay.

Collectively, these factors act to reduce the level of stream function on the site. For example, stream functions have been reduced through the removal of adjacent natural forested vegetation. This has reduced its value for wildlife, increased the water temperature, promoted algae growth, and acts to degrade available in-stream habitat.

F. Field Observations and Data
The EPA Rapid Bioassessment Protocol was utilized to determine stream habitat quality. The high gradient data sheets were used. The stream data sheets are included as Appendix 1. The assessments were performed on approximate 1000 foot intervals to provide conditions for the entire project reach. Additional stream data were collected to develop the stream design, including channel substrate data and channel profiles and cross-sections. See Appendix 3 for sediment data.

G. Water Quality
Town Branch is a tributary to Strodes Creek, which is on the CWA Section 303(d)

impaired waterbodies list. Upstream of the project site the watershed is primarily urbanized (City of Winchester). While specific data is unknown, point sources are likely to exist upstream of the site, with non-point sources likely due to agricultural, residential, and transportation uses (e.g., pasture and yard maintenance, and roadway runoff). This project should aid in addressing two of the four pollutant concerns identified for Strodes Creek in the Section 303 (d) report; those being sedimentation and dissolved oxygen.

H. Functional Assessment Tools

Streams will be assessed using the EPA Rapid Bioassessment protocol and its high gradient data sheets to determine if the habitat functions and values of the restored stream reaches have improved to expected levels. Additional success criteria, as described elsewhere in this plan, will also be monitored.

I. Soil Information

The site has been converted to pasture. The soil types that occupy areas that are proposed for restoration are mostly Newark silt loam (Ne), frequently flooded, and lesser areas of Huntington silt loam (Hs) that are subject to overflow. One area of Salvisa silty clay loam (ScD2) exists where minimal restoration activity is to occur. A map of the soil types and other pertinent soil information is included as Exhibit 5.

Newark soils lay within the valley bottom along the existing/design channel corridor. These soils are deep silt loams, somewhat poorly drained, with a high moisture-supplying capacity. They are high in natural fertility and easy to till. These soils suit plants that can tolerate water. The Huntington soil is deep, well-drained, and also has a high moisture-supplying capacity. They are also high in natural fertility and easily tilled. The Salvisa soils are shallow, somewhat excessively drained, with low moisture-supplying capacity. They are moderately high in natural fertility. The Newark and Huntington soil types were formed in recent alluvium washed from upland soils that were derived from limestone. The Salvisa soils are formed in residuum from high-grade limestone.

J. Photographs

Photographs of the site have been included in Exhibit 4, taken at assessment points. The photo locations are found on the aerial site maps noted as Exhibit 2A and 2B.

K. Responsible Parties

1. Applicant

Kentucky Transportation Cabinet
Attn: Mr. Danny Peake
200 Mero Street
Frankfort, Kentucky 40601
502/564-7250

2. Party Responsible for Mitigation Plan Design

T.H.E. Engineers, Inc.

Attn: Mr. David Heil, President
973 Beasley Street, Suite 130
Lexington, Kentucky 40509
859/263-0009

3. Party Responsible for Mitigation Plan Implementation, Success & Credit/Debit Tracking
   Kentucky Transportation Cabinet
   Attn: Mr. Danny Peake
   200 Mero Street
   Frankfort, Kentucky 40601
   502/564-7250

4. Property Owner
   City of Winchester
   Attn: Mr. Ken Kerns, City Manager
   32 Wall Street, P.O. Box 40
   Winchester, Kentucky 40392-0040
   859/744-2821

Section 2: Goals and Objectives of the Proposed Mitigation

A. *Functions & Values*
Proposed stream mitigation includes lengthening and restoration of 5862 feet of existing, degraded channel into a more natural channel approximately 7054 feet in length (see accompanying stream channel mitigation plan and design sheet(s)). The focus of the restoration project is to construct a meandering stream with good in-stream habitat and stable streambanks, that conveys the bankfull discharge and sediment supplied, and has the channel-floodplain interaction to the desired recurrence interval of approximately 1.2 to 1.5 years. Current and predicted stream habitat values using the EPA Rapid Bioassessment Protocol have been provided in the Stream Success Criteria table (Appendix 5). The predicted values represent the habitat improvement targets by which the success of the stream mitigation effort will be measured during the monitoring period. Channel morphology will be restored to lie within the central tendency of natural channels for the valley type and hydrology present, including meander pattern (sinuosity, radius of curvature, wavelength, and meander arc length), riffle-pool morphology, and section geometry (width-depth ratio, section asymmetry at pools, etc.).

The information and guidance provided in the EPA RBP was used to complete the "Habitat Assessment Field Data Sheet - High Gradient Streams" (Data Sheet) for Town Branch. The RBP score was compared to ranges provided by the Louisville District Corps in conjunction with their "Central Kentucky Protocol". The pre-project Data Sheets show that Town Branch scored relatively low and would be categorized as "Poor". The low habitat scores are due to the fact that the reach has been channelized (straightened), has high erosion potential (incised in areas with vertical banks), has little

to no forested riparian area on either bank, and has a lower substrate diversity (due to presence of bedrock). The predicted RBP score for the restored stream (Appendix 5) are in the "Excellent" range. Post-project Data Sheets will be completed as part of the final monitoring report.

B. *Functional Gains*
Stream functional gains will be determined by collecting stream habitat data using the EPA Rapid Bioassessment Protocol for the restored stream reach and compare pre-project stream habitat values to the post-project values. Stream functional gains will be credited as the net gain in functions and values, on a linear foot basis, consistent with the protocol used by the Louisville District. Estimated stream credit for the site is included in Appendix 6.

Final stream credits, and the credit release schedule, will be determined by the Corps; based on the "as-built" conditions. This information will be provided to KYTC. Annual debit and credit accounting will reflect this credit schedule. KYTC understands that should the debits exceed the final credits available at the end of monitoring, additional mitigation will be required by the Corps.

C. *Potential Challenges*
Specific to this project is the challenge of providing a design that addresses the need to raise the streambed above the rock line (for habitat concerns) while not impacting the current normal water surface conditions (hydrology) of the stream on private property located in the middle of the site. Additionally, there is a need to meet the requirements of the Federal Emergency Management Agency (FEMA) regarding impacts to the existing designated 100-year floodplain. These concerns were addressed by conducting a series of analyses utilizing the HEC-RAS Model. The design hydrology is based on the existing conditions found in the watershed upstream of the site, which is primarily urbanized and not expected to significantly change. The higher discharge rates studied (i.e., the 100-year flood) are controlled by culverts under a railroad and the interstate.

The construction of stream restoration projects where channel relocation occurs in close proximity to the existing stream is inherently challenging, due to concerns over maintaining/managing current flows while minimizing excessive sedimentation and erosion. In addition to standard erosion prevention and control BMPs (e.g., silt fencing, erosion control blankets), the use of temporary diversions channels and a "pump around" are proposed so that stream channel construction may be performed "in the dry". Sufficient remedial and contingency plans and adaptive management are incorporated in the plan to ensure that all likely challenges, such as potential effects from invasive species or stream channel instability, can be quickly addressed during the five year monitoring period. At the end of the five-year monitoring period, if mitigation is only partially successful or unsuccessful, KYTC will submit a Contingency Plan to the Corps or propose to extend the monitoring period beyond five years until such time as the Corps determines the project is successful. The plan or extension of monitoring will not be implemented without prior approval from the Corps.

D. *Environmental Goals and Objectives*
The goal of this project is to restore the stream to a more natural condition by applying appropriate stream restoration principles; resulting in a stable channel that will, over time, neither aggrade or degrade.

Stream restoration on the site is expected to meet the following objectives: (a) to improve in-stream and riparian habitat; (b) to create a natural channel that is in geomorphic equilibrium and exhibits improved channel stability, and (c) to help promote hydrologic connectivity to the floodplain surrounding the restored stream channel.

Section 3: Mitigation Work/Implementation Plan

I. Site Preparation:
A. *Plans*
KYTC has developed an integrated plan that would result in the complete restoration of the site's stream. T.H.E. Engineers, Inc. (THE), designed the stream restoration and collected the necessary stream data using on-site and other data sources.

KYTC will construct the permitted stream in accordance with the approved plans, and will not make any significant field changes without the prior approval of the USACE. KYTC and/or their consultant will be on-site during the entire construction process and will be supported as needed by a staff ecologist or biologist. During construction, KYTC and/or their consultant will ensure the use of standard erosion control methods that are applicable to the mitigation site.

Description of plans for the following criteria:
1. Grading – The site will be graded to the dimensions shown on the plans, which include stream gradient, bankfull channel, floodprone area, point bar and riffle slopes and pool locations. Excess material from excavation of the design channels will be used to fill the existing, degraded channels, but it is expected that several remnant channels will be left. These will be "plugged" to eliminate any direct flow through them. This will minimize the need to borrow material from the existing landscape to completely fill in the existing channel.

2. Hydrologic changes – The upstream watershed is primarily urbanized through commercial and residential construction, with little opportunity for significant changes; therefore, it is reasonable to assume that no hydrologic adjustments are needed. In the project area there will be a change in water surface elevations due to a vertical adjustment in the proposed channel profile and use of a more appropriate bankfull channel width. To address concerns of adjoining property owner, the design accommodates an insignificant change in baseflow elevations. The difference in existing and proposed water surface profiles diminish as flow rates increase (i.e., from a bankfull discharge to a 100-year discharge), due to more accessibility to the floodplain. A flood analysis indicates that the 100-year flood elevations are essentially unchanged from the current published FEMA flood study for Town Branch.

3. Water control structures – There are no permanent water control structures. Sections of the existing channel will remain in place as remnant, or oxbow, channels. There will be permanent plugs installed in the existing stream as remnant channels are separated from the proposed channel at intersection points. Temporary water control structures will be used to manage flow during construction. Utilizing a "pump around" during construction requires a temporary damming of the existing channel to cutoff flow for pumping to a point downstream. This operation will be monitored continuously and repositioned as necessary while construction progresses.

4. Exotic vegetation control – Exotic vegetation control is discussed in detail elsewhere in this document.

5. Erosion control – Erosion control blankets will be installed along the side slopes of all design channels, with the exception of the inside bends of pools, where the design slope is 8:1. Silt fencing will be constructed, as necessary, along the design channel and riparian corridor to prevent the transport of disturbed soils from the riparian corridor into the design channels. These silt fences and other erosion control methods will be maintained as necessary to ensure their functionality. Other areas will be seeded and mulched as described in detail elsewhere in this document.

6. Bank stabilization – Bank stabilization will be accomplished through the use of erosion control blankets as described above, and J-hook vanes at the "plug" locations where remnant channels are separated from the proposed channel. In some locations grade control in the form of Double-Invert Cross Vanes is utilized to stabilize streambed and banks.

7. Equipment and procedures to be used – A variety of common equipment and tools will be used as site conditions dictate. Prior to channel construction, the site will be mowed to allow easy access, being especially cautious not to disturb the survey benchmarks established on the site. The channel thalwag will then be laid out in plan form. Stakes with flags will be installed to mark the thalweg and radius points for the design channel. The bankfull channel will then be constructed to the depth and cross section dimensions prescribed in the design. Following the construction of all bankfull design sections, the design channel profile and cross sections will be surveyed and checked against the design values. This process will be repeated until the constructed channel profile and dimensions matches, within an acceptable tolerance, that of the design. Due to the length of the project, it will be necessary to define discrete reaches within the project that can be constructed to prescribed stages before moving on. In this way the project can be constructed while minimizing the amount of flow diversion or pump around, as well as maximizing the efficiency of erosion control and implementation of vegetation. Once this is accomplished, the erosion control blankets and silt fencing will be installed. Riparian vegetation will then be planted.

8. Site access control – The site is protected by the City and the Strodes Creek Conservancy against vandalism. Public use and access is not a concern due to the

topography of the area. The SCC will monitor access to the site during the construction and monitoring phases to ensure that damage or vandalism does not occur.

9. Strategy for minimizing soil compaction – It is not anticipated that construction will utilize heavy equipment. Soil compaction will be localized and center around design channels. If necessary, light disking or scarification of planting and seeding areas will be performed to ensure suitable soil conditions. Additionally, should compaction become an issue, holes for trees and shrubs can be over-excavated and loosely backfilled to facilitate root development.

10. Stream Pattern, Profile, and Dimension – Design stream pattern, profile, and section dimensions were determined by T.H.E. Engineers, Inc. These parameters are given in Table 1, and based on morphological data and natural stream design concepts.

B. *Soils/Substrate*

The existing stream substrate consists predominantly of bedrock, cobble, and gravel. Some silt/clay material is present. Information on the particle size distribution is found in Appendix 3. The existing channel has relatively little morphologic variation compared to natural channels, but a riffle/pool morphology is present in the lower reach, while the upper reach is primarily riffle/run.

C. *Hydrology*

1. Identification of the source of hydrology/water supply, estimated size of the watershed, and connections to existing waters – The watershed for Town Branch is 3.48 square miles at the upper end of the project; including the drainage area for a tributary that contributes 0.53 square miles of watershed. The Town Branch watershed is 4.06 square miles at the lower project limit. The tributary (T3 on FEMA flood maps) to Town Branch enters just below the railroad culvert at the upper project limit. Sources for stream hydrology are direct run-off and flow from T3, which is an intermittent stream. Town Branch flows directly into Strodes Creek at a point approximately 1300 feet downstream from the lower project limit.

2. General information on the average frequency, depth and duration of water available to the site under normal conditions – Existing information on normal flow conditions could not be found, however, the observed flow depths during field visits ranged from 0.2 feet to 1.5 feet (at pools). Because of the urbanized nature of the upper watershed for Town Branch, it appears to react quickly to significant rainfall (due to runoff from impervious surfaces). Discharge information used for the HEC-RAS analysis, obtained from the USGS Kentucky Water Science Center, included a Q2=334 cfs for Town Branch and a Q2=96 cfs for tributary T3. Results of the channel modeling performed for FEMA purposes are available upon request.

3. Need for groundwater monitors/piezometers to help evaluate groundwater elevations and/or flow – Groundwater does not appear to be a significant contributor to stream flow. Installation of piezometers was not included in the plans. If deemed necessary by

the Corps, they can be added. Flow monitors are not necessary because the stream is perennial and flow patterns have been adequately documented through a series of prior site visits over several years and during several seasons of the year.

D. *Planting Plan*
KYTC will restore vegetation to the site in three planting zones; (Zone 1) the main riparian corridor along the stream, (Zone 2) low areas within the main corridor associated with remnant channels, and (Zone 3) a utility corridor within the riparian area associated with an existing sewer line. The general plan is as follows:

1. The riparian area will be planted in late fall or winter with a minimum of 60 two to three (2-3) gallon container grown RPM trees per acre. A table with a list of chosen species is incorporated into the plans. The table lists the native species to be planted, both scientific and common names. They will be planted on an approximate 25' by 25' spacing (yielding a density of approximately 70 trees per acre), and will be planted in a staggered or irregular pattern.

2. The contractor will determine the source of seeds and plantings. Only native plant species will be planted. KYTC personnel/or their consultant will inspect the plantings before installation. Annual rye grass may be used in addition to the native seed mix to establish quick cover.

3. All of the planted trees will come from the list in Appendix 4, and no species will comprise more than 20 percent of the total initial planting. Planting locations or layout are shown on a planting plan detail sheet. They typically will begin at bankfull elevations and extend to the limit of the defined riparian zone (approximately 200 feet in total width). Mostly facultative or wetter species have been selected due to observed standing water in the floodplain, the soil types present, and the expected wet conditions in the remnant channels. Shrub or mid-story species identified in Appendix 4 will also be established at an initial planting density of at least 60 per acre. The shrubs will be interspersed with the trees in the riparian area.

4. Few trees exist on or near the project site, and those present are less desirable species; therefore, transplanting is not proposed for this project. Since the existing trees are native species, efforts will be made to leave as many as possible.

5. Expected volunteers species include sycamore, hackberry and Osage orange. This is based on species that currently exist in the area.

E. *Exotic and Undesirable Species Control*
KYTC will ensure that invasive species will not affect the future condition of the restored stream and riparian zone. Efforts to reduce introduction will consist of cleaning equipment before it reaches the site, inspecting labels on seed mixtures and mulch for composition. If exotic vegetation establishes, eradication techniques include burning, spraying or manual/mechanical removal. Monitoring for invasive species will take place during the annual vegetation conducted on the site.

F. *Schedule*
Construction associated with restoration of the stream is tentatively scheduled to begin in the spring of 2009, if the necessary permits are received from the Corps and KDOW. Tree seedlings would be planted in the fall of 2009 if construction is completed by the end of summer. The initial monitoring of the site will commence in the first full growing season post initial planting and will consist of data collected during the beginning and end of the growing season. Depending on the completion of construction and the tree planting, monitoring schedules will be adjusted accordingly.

G. *Construction Monitoring*
KYTC and/or its consultant will monitor the construction activities to ensure that all aspects of the approved mitigation plan are completed without incident. To accomplish this, KYTC will require on-site management of the construction personnel by one or more people familiar with the design of the project. These representatives will include the KYTC Project Manager and their consultant and others familiar with the project that have complete knowledge of the mitigation and design plans and some understanding of soil science, hydrology, botany or plant ecology.

II. <u>As-Built Conditions</u>:
KYTC will submit a report, including construction documents, to the Corps within twelve (12) weeks of completion of site preparation and planting, describing as-built plan and profile of the mitigation project, including topographic contours, locations of final plantings, structures, and other mitigation features, final lengths and areas of restored streams. KYTC will include any deviations from the original plan that will affect the predicted stream credit. Appendix 6 will be revised based on the "as-builts", reflecting any deviations from the predicted stream credit. This "as-built" credit matrix will be the basis of the annual tracking of the success criteria. Separate reports for grading and planting work will be submitted if these are not completed within six weeks of each other. The initial planting report will not be considered as a monitoring report.

KYTC shall also provide topographic maps showing as-built contours for the restored streams and adjacent riparian and wetland areas. This would entail measurements of stream pattern, profile, and dimension. These maps will also indicate the locations of any plantings and any other installations or structures that were implemented in the mapped areas.

III. <u>Financial Assurances</u>:
KYTC has secured sufficient funding to construct and monitor the mitigation project, and provide sufficient contingency funds for remedial actions. The City and SCC have the funding and resources to manage and protect the site in the long-term. The Corps holds the applicant, KYTC, ultimately responsible for project success, including financial assurances.

Section 4: Success Criteria

The success criteria discussed and shown in Appendix 5 identify and define the specific criteria for measuring the success of the mitigation effort. The criteria will be measurable and achievable.

Minimum Success Criteria:
The success criteria for the stream is based on the three primary factors: (1) meeting stream channel geomorphology design characteristics to ensure stream stability and function, (2) achieving predicted habitat assessment scores, and (3) ensuring the adequate establishment of a functional riparian area. The success criteria are shown in Appendix 5. These criteria are believed adequate to justify expected stream stability and habitat improvements.

Section 5: Monitoring

I. Monitoring Reports: KYTC will provide an annual report, based on data collected twice per growing season, to the Corps and KDOW by January 31 for each previous year of the 5-year monitoring effort. The annual report will be based on information collected by KYTC and/or their consultant as described below. The first monitoring report will be completed after the first full growing season following the initial planting of tree seedlings.

Upon submittal of the final annual report, KYTC will request the Corps' release from further monitoring. The final annual report will include an explanation of how the goals of the mitigation have been met, a discussion of the stream ecosystem's ability to be self-sustaining, and a comparison of the mitigation site's stream both pre- and post-project using the same functional assessment method. An inspection of the site will then be coordinated with KYTC, their consultant, and the City, and conducted by the Corps to confirm the successful completion of the mitigation plan. Upon the Corps' review and confirmation of the successful completion of the mitigation plan, KYTC will be released from additional monitoring and reporting requirements.

A. *Timing*
KYTC and/or their consultant will conduct biannual vegetation inspections with one inspection occurring in the first month and one in the last month of the growing season for each calendar year. Photographs will be taken of the vegetation monitoring plots to get an early-in-the-year record and observe any new problems. KYTC and/or their consultant will also make several site inspections at the beginning of the growing season during each year of the monitoring period to monitor hydrology. The vegetation monitoring data will be collected during both early and late season site visits and will be included in the annual monitoring report.

B. *Monitoring Methods*
KYTC and/or their consultant will monitor stream hydrologic characteristics and stability as necessary and appropriate to determine if stream success criteria are being met. For riparian vegetation, the following vegetative monitoring procedures and protocols will be used:

- Two (2), permanent 0.25-acre vegetation monitoring plots will be created within the restored riparian areas, one in the upper reach and one in the lower reach of the project. These vegetative monitoring plots will be monitored bi-annually, during the early and late growing season for the duration of the monitoring period. If the vegetative success criterion is not met, remedial actions will be taken to meet the vegetative success criterion. All proposed vegetative remedial actions will be approved by the Corps.

- A center stake will be established to mark the location of each monitoring plot, and photographs will be taken of these plots annually from a point 25 feet away and due west of the center stake.

- The number of planted hardwoods and the number of volunteer hardwoods of targeted species present will be counted within each plot during each growing season of the monitoring period.

- A qualitative vegetation monitoring survey will also occur at the beginning and end of the growing season. This survey will serve to (a) identify the plant species occurring on the site during both the early and late growing season so that a complete vegetation list can be derived, and (b) provide a bi-annual screening for invasive species, so that those species can be addressed or treated as may be necessary at the earliest possible time.

C. *Documentation*
KYTC and/or their consultant will document the conditions at the mitigation site and provide a written summary of how the site meets or does not meet the goals and objectives of Section 2 of this plan. The initial report will include a discussion of any deviations from the Mitigation Work/Implementation Plan (Section 3). The following format and sequence will be used in the development of the monitoring report:

1. Soils/substrate – Pebble counts and core samples will be collected to determine if the size distributions are approximate to those assumed for the design channels.

2. Vegetation – Riparian vegetation conditions observed during the monitoring effort will be identified and compared to pre-project vegetation conditions and to the vegetation success criteria. KYTC and/or their consultant will assess how the success criteria are being met, including, but not limited to, percent native tree species, maximum percent invasive species, minimum native tree stem density per acre, maximum percent any one tree species, survival rate of planted tree species, ratio of planted tree species vs.

volunteer tree species, and percent vegetative cover. KYTC and/or their consultant will also include a species composition list including both scientific and common names.

3. Hydrology – Hydrologic conditions observed during the monitoring effort will be identified and compared to the hydrologic success criterion. KYTC and/or their consultant will describe the sources of hydrology (e.g. precipitation, overbank flooding, groundwater) that are or appear to be affecting the site and include information on surface water depth.

4. Channel geomorphology – KYTC and/or their consultant will describe the as-built profiles, cross sections, in-stream habitat characteristics, and substrate composition. The discussion will related specifically to the Success Criteria (Appendix 3) and will provide sufficient detail for a reasonable person to judge whether or not the anticipated stream type(s) were restored and that those streams are stable. The restored channels will be visually inspected at least quarterly during the first two years after construction and semi-annually for the remainder of the monitoring period to identify potential signs of instability. Photographs of the stream channels will be taken to document changes in the channels, especially sites where instability may be occurring.

5. Remediation – KYTC and/or their consultant will describe any remedial measures that will be necessary to ensure successful establishment the restored streams on the site.

D. *Responsible Parties*

1. Applicant
   Kentucky Transportation Cabinet
   Attn: Mr. Danny Peake
   200 Mero Street
   Frankfort, Kentucky 40601
   502/564-7250

2. Party Responsible for Oversight of Construction of Mitigation
   Kentucky Transportation Cabinet and/or designated consultant
   Attn: Mr. Danny Peake

3. Party Responsible for Mitigation Plan Implementation, Success & Credit/Debit Tracking
   Kentucky Transportation Cabinet
   Attn: Mr. Danny Peake

II. Assessment of Function/Value Replacement: In the annual report, KYTC and/or their consultant will use the EPA Rapid Bioassessment protocol of high gradient streams to measure stream and riparian habitat improvements and describe those results in the annual report. If a success criterion is not met for all or any portion of the mitigation area in any year, KYTC and/or their consultant shall also provide an analysis of the

cause(s) of failure and any proposed remedial action(s). The annual report will also include a ledger of the credits and debits for the reporting period and a photograph of each monitoring plot.

III. Release from Monitoring:

A. *Mitigation Site Delineation*

Prior to requesting release from monitoring, KYTC and/or their consultant will conduct a delineation of the mitigation site. The preliminary delineation will be submitted with the final annual monitoring report and will designate the reach and associated riparian zone width restored or enhanced. The Corps and KDOW will then have the opportunity to verify the delineation during a site inspection. If the Corps determines the delineation is correct, the boundary will be surveyed, and a certified copy of the final delineation will be provided to the Corps and KDOW. If revisions to the delineation are necessary, the boundary will be remarked during the site inspection and then surveyed, and a certified copy of the final delineation will be provided to the Corps and KDOW.

B. *Long-term Management and Maintenance Plan*

All streams that are restored and enhanced on the site (including the riparian zone for which credit was given) will be permanently protected and remain undisturbed. The City will protect the entire parcel in perpetuity through its continued ownership of the tract. The SCC has the entire site under an existing conservation easement, through an executed of a memorandum of agreement with the City; which permanently protects the mitigation site and significantly restricts the parcel's use.

The City and SCC will make funds available to provide management and stewardship for the site to ensure its management and protection from incompatible uses. KYTC will provide funds to permanently mark the boundaries of the mitigation area and place signs stating no mowing, spraying, disturbance, etc., which will include the restored stream and surrounding riparian area. Future management of the site will largely consist of passive management, which will allow the stream and riparian area to develop and evolve naturally.

Section 6: Contingency Plan

KYTC will take reasonable and appropriate steps to ensure that stream channels, vegetation, and hydrology are restored on the site in order to achieve the success criteria described above. However, site and other limitations (e.g., engineering considerations and requirements) may create situations where stream channel and riparian zone success criteria are not and/or cannot be met fully or in part on portions of the site. This may be an inevitable outcome of this project. KYTC recognizes that the Corps likely will not give stream credit for those areas that do not meet the vegetative, hydrologic, and stability criteria necessary for the geomorphic, vegetation, and habitat criteria for streams.

If the objectives of the mitigation plan cannot be met or if a success criterion is not met

for any portion of the project in any year, or if the success criteria are not satisfied, KYTC shall prepare an analysis of the cause of failure. If determined necessary by the Corps, KYTC will propose remedial action for the Corps' pre-approval. KYTC will then undertake the corrective measures to address or repair the problem(s). If, after undertaking the remedial actions, it is found that the success criteria and mitigation still cannot be satisfied, the available credits will be adjusted accordingly and an alternate source for the mitigation required will identified by the KYTC. Similarly, if the site ultimately does not produce the number of credits anticipated, KYTC will be responsible for providing additional mitigation from an alternate source approved by the Corps and KDOW.

List of Tables

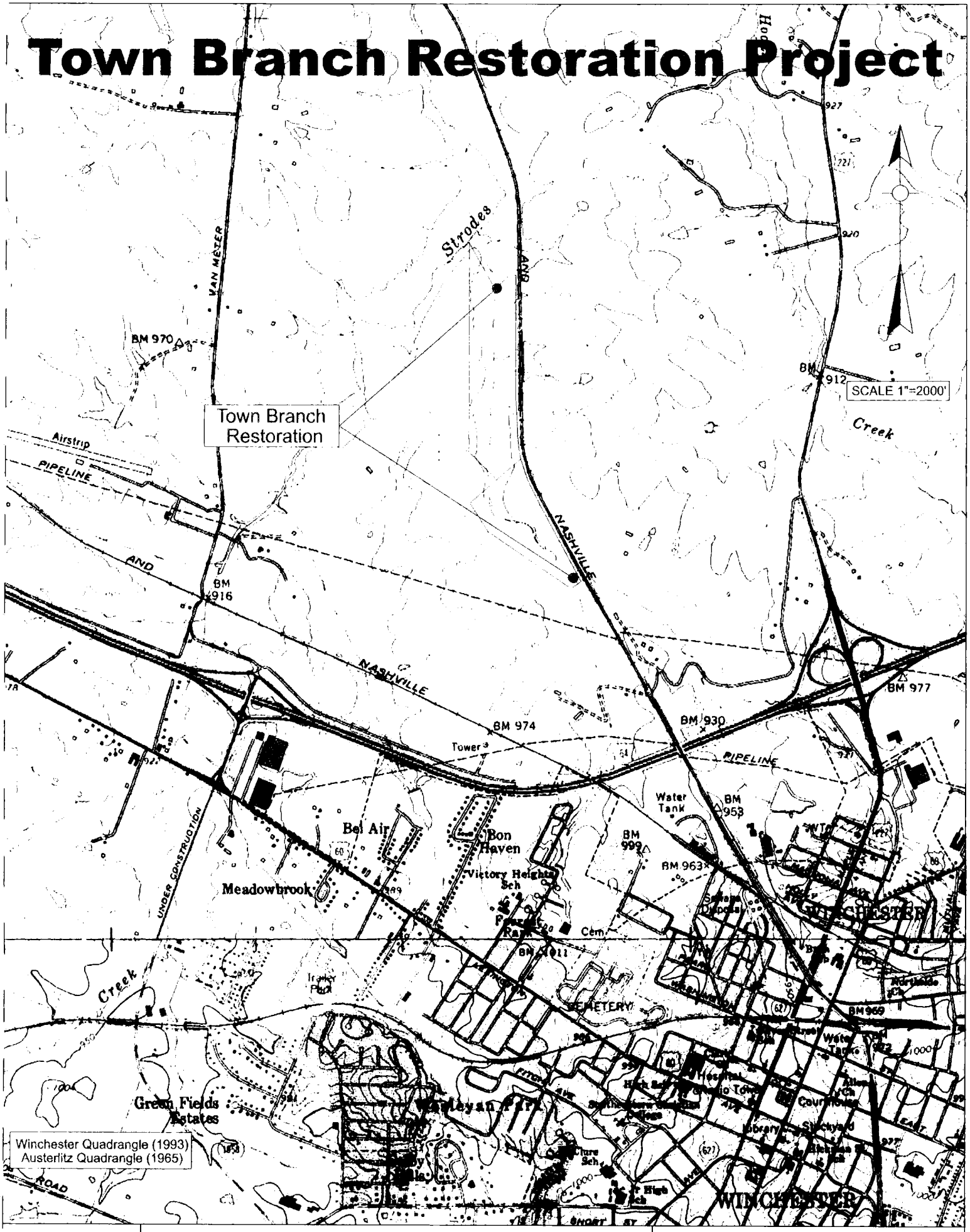
List of Exhibits

List of Appendices

Table 1: Geomorphic Stream Data

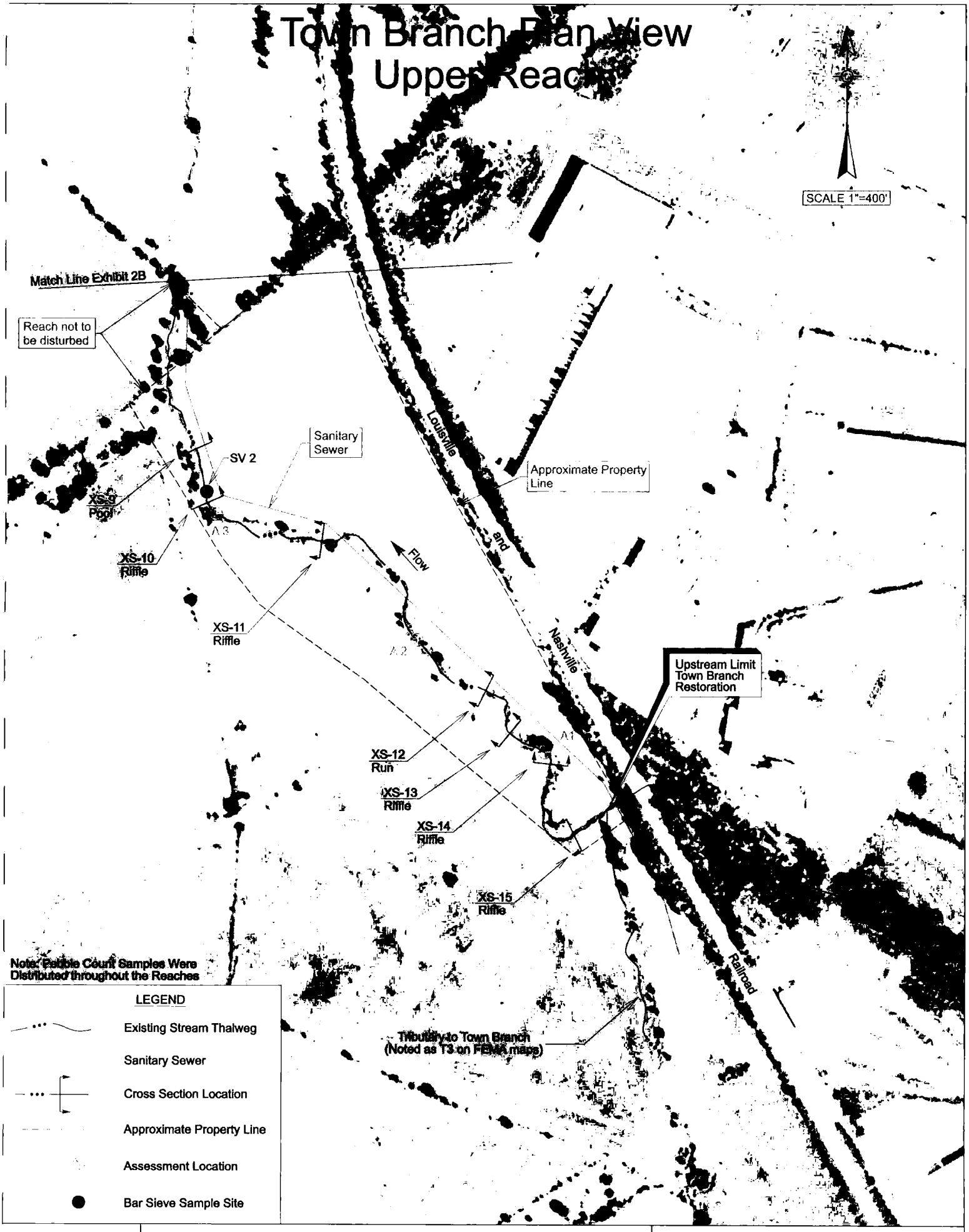
	TOWN BRANCH - TRIBUTARY TO STRODES CREEK																		
	EXISTING															PROPOSED			
	Downstream Reach								Upstream Reach							Downstream		Upstream	
Cross Section	1 Riffle	2 Riffle	3 Pool	4 Pool	5 Riffle	6 Pool	7 Riffle	8 Riffle	9 Pool	10 Riffle	11 Riffle	12 Run	13 Riffle	14 Riffle	15 Riffle	Typical Riffle	Typical Pool	Typical Riffle	Typical Pool
Drainage Areas (acres)	2575	2550	2455	2445	2415	2415	2415	2415	2300	2300	2300	2200	2200	2200	2200	2575	2575	2300.00	2300
Rosgen Stream Type (Level II)	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4
Bankfull Discharge Flow (CFS)	93.17	82.58	~~~	~~~	64.92	~~~	108.10	86.10	~~~	73.73	74.79	73.30	77.22	61.39	63.96	115.43	~~~	86.22	~~~
D_{50} Classification Pool/Riffle	32.00								46.60							gravel	gravel	gravel	gravel
D_{50} Riffle/Pavement (d50)	60.40								56.10							gravel	gravel	gravel	gravel
D_{50} Bar/Subpavement (ds50)	20.80								9.90							gravel	gravel	gravel	gravel
D_{100} Bar/Subpavement (Di)	143.00								80.00							cobble	cobble	cobble	cobble
Bankfull Water Surface Slope (ft/ft)	0.0026								0.0024							0.00265	~~~	0.00265	~~~
Channel Slope, ft/ft	0.002947, 0.002891															0.00265	~~~	0.00265	~~~
Valley Slope, ft/ft	range: 0.003091- 0.003166, average=0.003136															~~~	~~~	~~~	~~~
Riffle Slope, ft/ft	0.01557	0.00316	~~~	~~~	0.01401	~~~	0.01499	XXX	~~~	XXX	XXX	XXX	0.04358	0.02132	0.02657	0.001-0.008		0.001-0.01	
Sinuosity	range: 1.06 - 1.15, average=1.1															1.37		1.30	
Mean Riffle Depth (@BKF)	1.19	1.02	~~~	~~~	0.83	~~~	1.37	1.35	~~~	1.02	1.14	1.02	1.33	0.88	1.00	1.62	~~~	1.52	~~~
Max. Riffle Depth (@BKF)	1.72	1.59	~~~	~~~	1.48	~~~	2.24	1.89	~~~	2.04	2.20	1.95	2.17	1.87	1.89	2.20	~~~	2.20	~~~
Mean Pool Depth (@BKF)	~~~	~~~	2.37	2.10	~~~	1.73	~~~	~~~	1.45	~~~	~~~	~~~	~~~	~~~	~~~	~~~	1.99	~~~	1.75
Max. Pool Depth (@BKF)	~~~	~~~	2.86	2.63	~~~	2.99	~~~	~~~	1.78	~~~	~~~	~~~	~~~	~~~	~~~	~~~	4.20	~~~	4.20
Belt Width	range: 63 - 220, average=113															65-255, avg=170		85-230, avg=170	
Radius of Curvature	range: 47 - 143, average=95															60-95		60-95	
Meander Wavelength	range: 140 - 464, average=297															185-445, avg=300		220-445, avg=330	
Floodprone Width	75.62	>95	~~~	~~~	71.89	~~~	>103	>88	~~~	55.90	>95	72.47	79.50	>106	52.88	>64	>64	>55	>55
Bankfull Width	29.25	34.17	33.33	31.82	36.79	26.67	27.95	21.32	23.25	31.84	24.86	29.52	22.00	33.98	26.67	25.2	32.9	21.20	28.9
Bankfull Area	34.82	34.80	79.98	66.70	30.47	46.15	38.30	28.86	33.63	32.56	29.82	30.14	29.15	29.93	26.77	40.92	49.39	32.12	40.59
Entrenchment Ratio	2.59	>2.7	~~~	~~~	1.95	~~~	~3.7	>4.1	~~~	1.76	>3.7	2.45	3.61	>3.1	1.98	2.5 (min)	~~~	2.5 (min)	~~~
Width: Depth Ratio	24.58	33.50	~~~	~~~	44.33	~~~	20.40	15.79	~~~	31.22	21.81	28.94	16.54	38.61	26.67	15.56	~~~	13.95	~~~
Wetted Perimeter	30.40	34.69	35.28	33.66	37.44	29.90	29.43	22.48	24.35	32.79	25.76	30.04	23.20	34.96	27.40	25.91	34.69	21.91	30.91
Mannings "n"	0.031	0.032	~~~	~~~	0.031	~~~	0.032	0.030	~~~	0.032	0.032	0.030	0.032	0.032	0.030	0.035	~~~	0.0350	~~~
Hydraulic Radius (R)	1.15	1.00	2.27	1.98	0.81	1.54	1.30	1.28	1.38	0.99	1.16	1.00	1.26	0.86	0.98	1.58	1.42	1.47	1.31

Town Branch Restoration Project



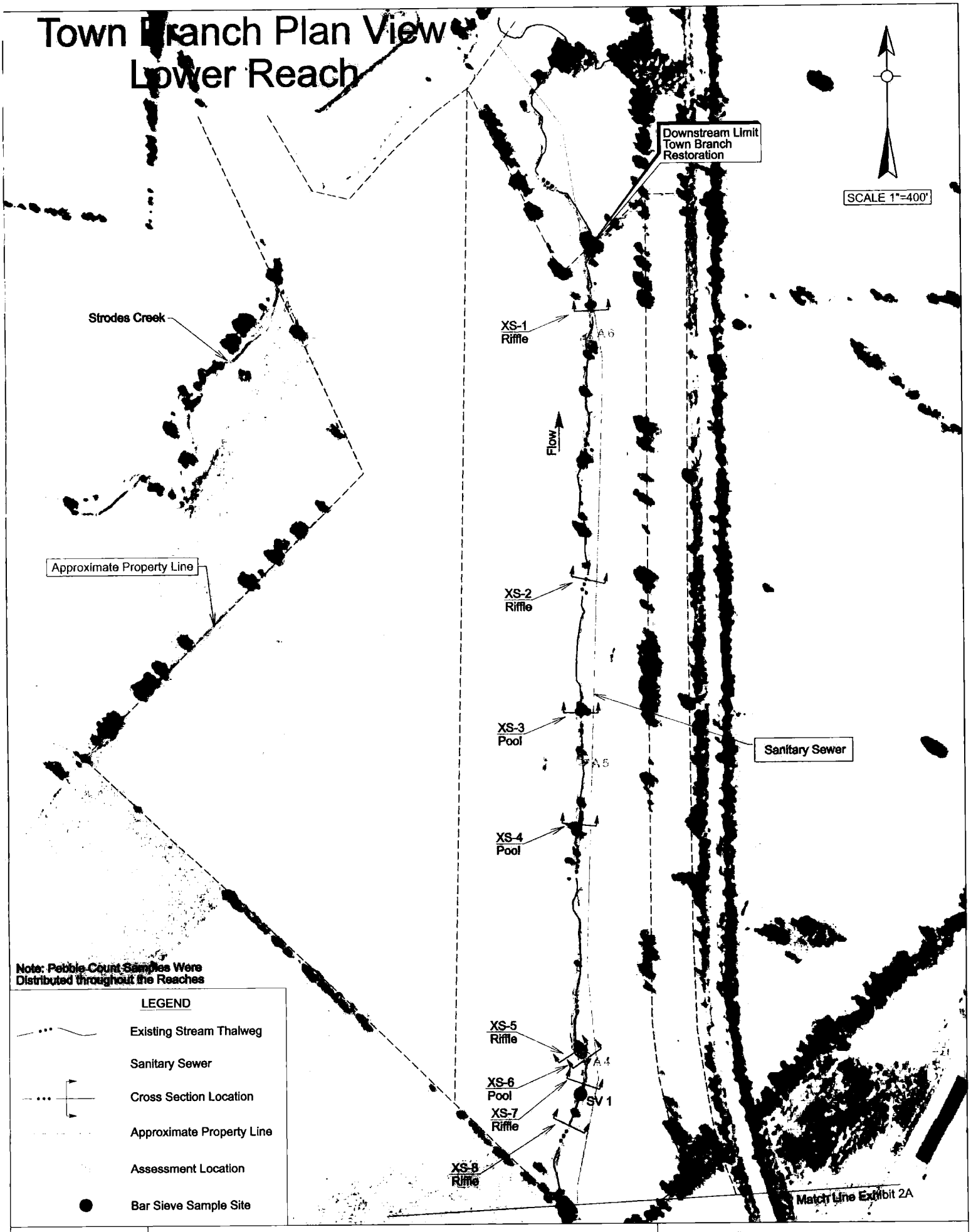
Kentucky Transportation	Project: Town Branch Restoration Project				
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester, Ky.	Vicinity Map	Exhibit 1

Town Branch Plan View
Upper Reach



Kentucky Transportation	PROJECT: Town Branch Restoration		Stream: Town Branch		
	COUNTY: Clark	STATE: KENTUCKY	Near Winchester KY	Plan View	Exhibit 2A

Town Branch Plan View Lower Reach



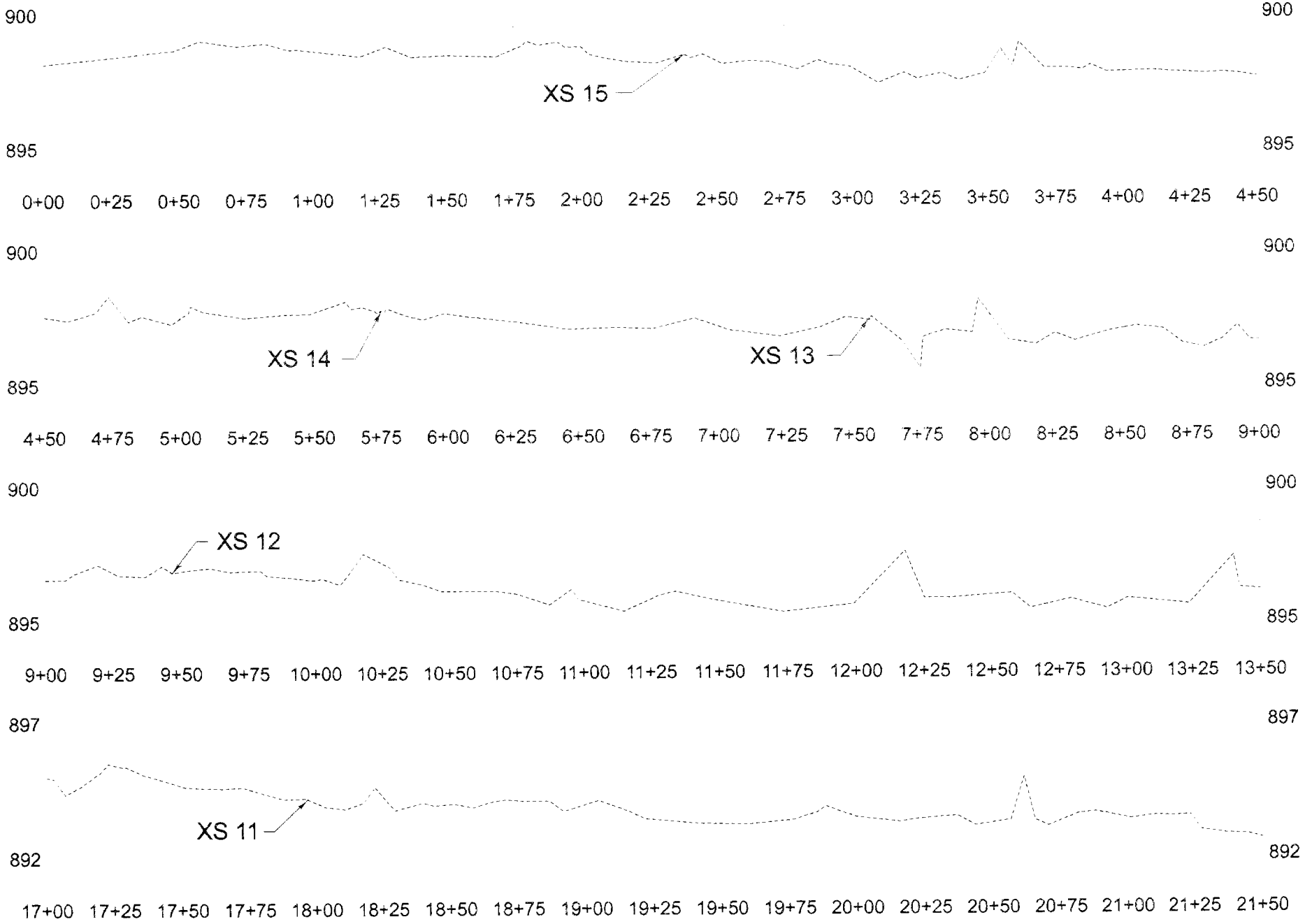
Kentucky Transportation	PROJECT: Town Branch Restoration			Stream: Town Branch	
	COUNTY: Clark	STATE: KENTUCKY	Near Winchester KY	Plan View	Exhibit 2B

Existing Mainline
Representative Reach Profile

Horz Scale: 1"=50'
Vert Scale: 1"=5'

Kentucky Transportation

PROJECT: Town Branch Restoration
COUNTY: Clark
STATE: KENTUCKY
NEAR: Winchester
Representative Reach Profile
Existing Profile
Exhibit 2C (1)



Existing Mainline
Representative Reach Profile

Horz Scale: 1"=50'
Vert Scale: 1"=5'

Kentucky Transportation

COUNTY: Clark

PROJECT: Town Branch Restoration

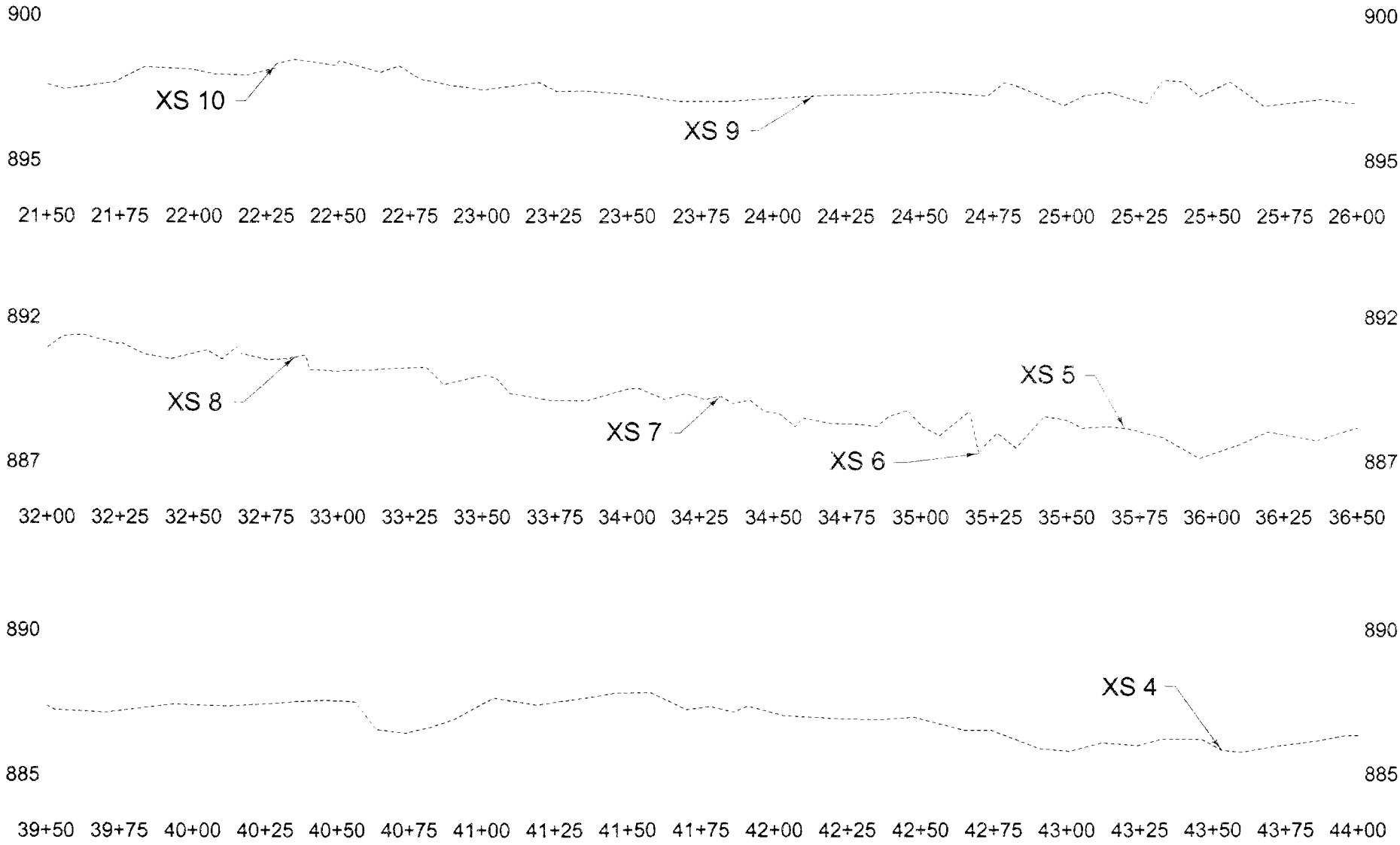
STATE: KENTUCKY

NEAR: Winchester

Representative Reach Profile

Existing Profile

Exhibit 2C (2)

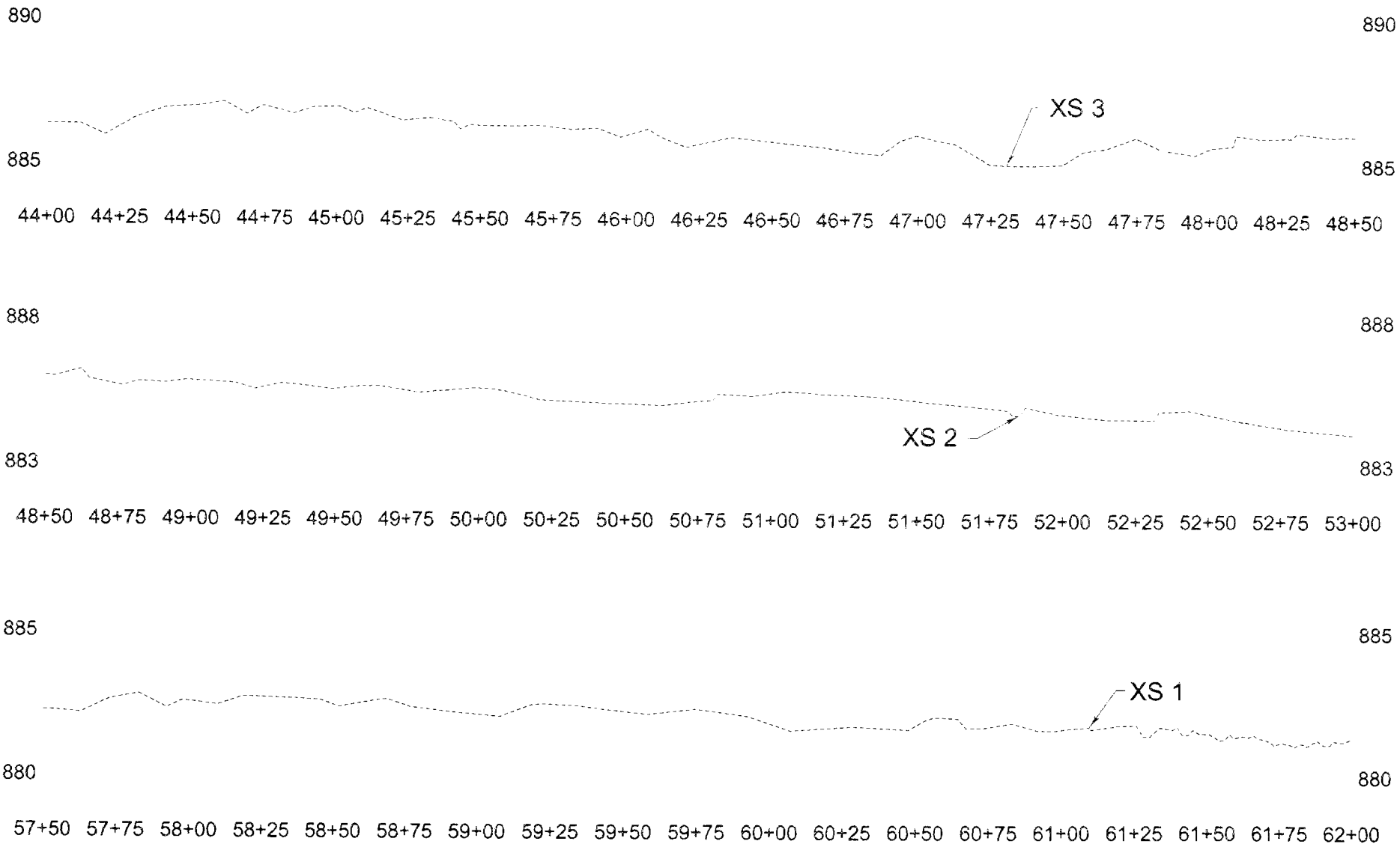


Existing Mainline
Representative Reach Profile

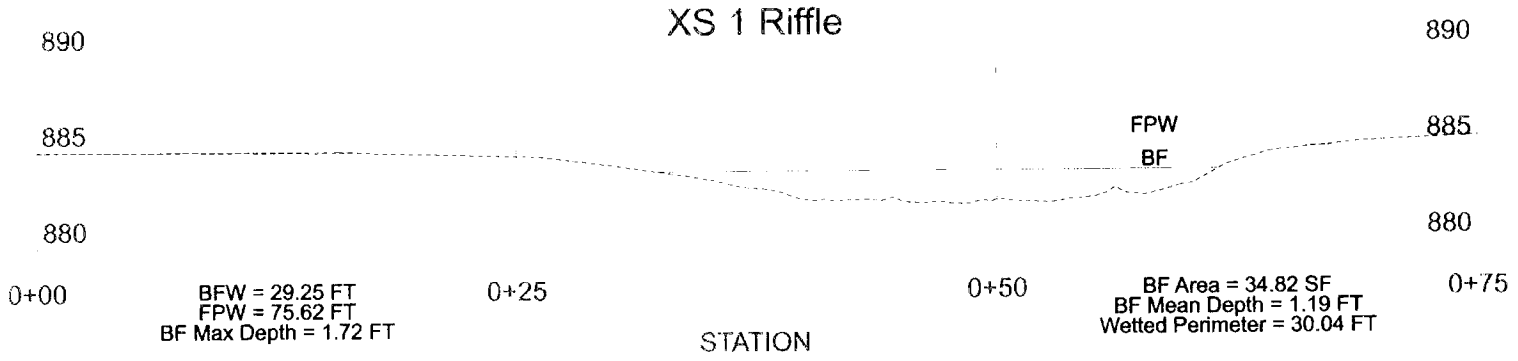
Horz Scale: 1"=50'
Vert Scale: 1"=5'

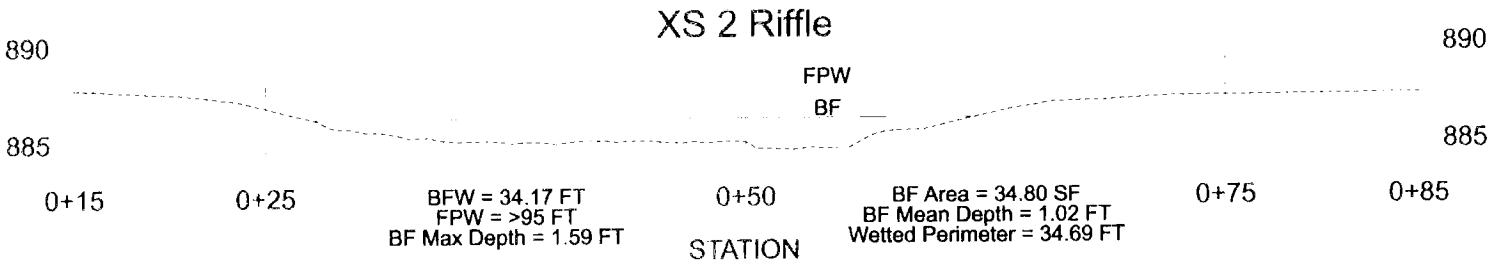
Kentucky Transportation

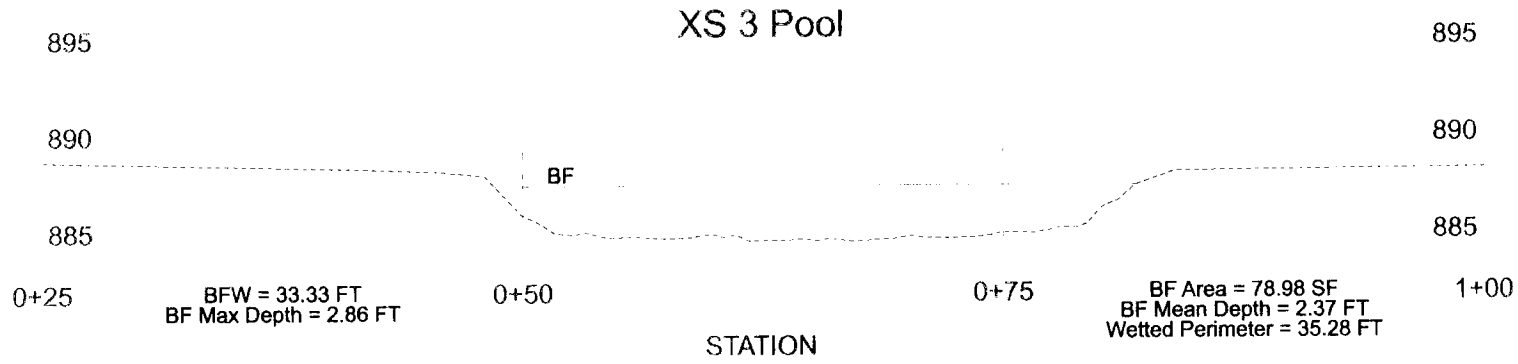
PROJECT: Town Branch Restoration
COUNTY: Clark
STATE: KENTUCKY
NEAR: Winchester
Representative Reach Profile
Existing Profile
Exhibit 2C (3)

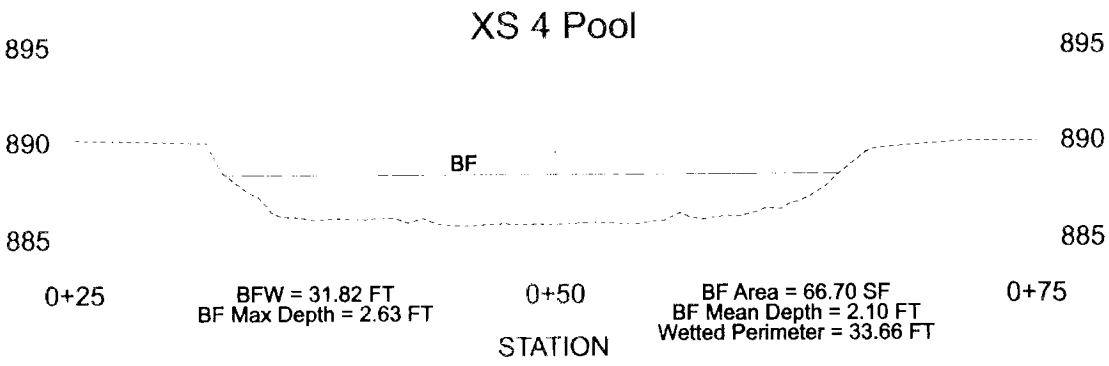


Existing Mainline Cross Sections





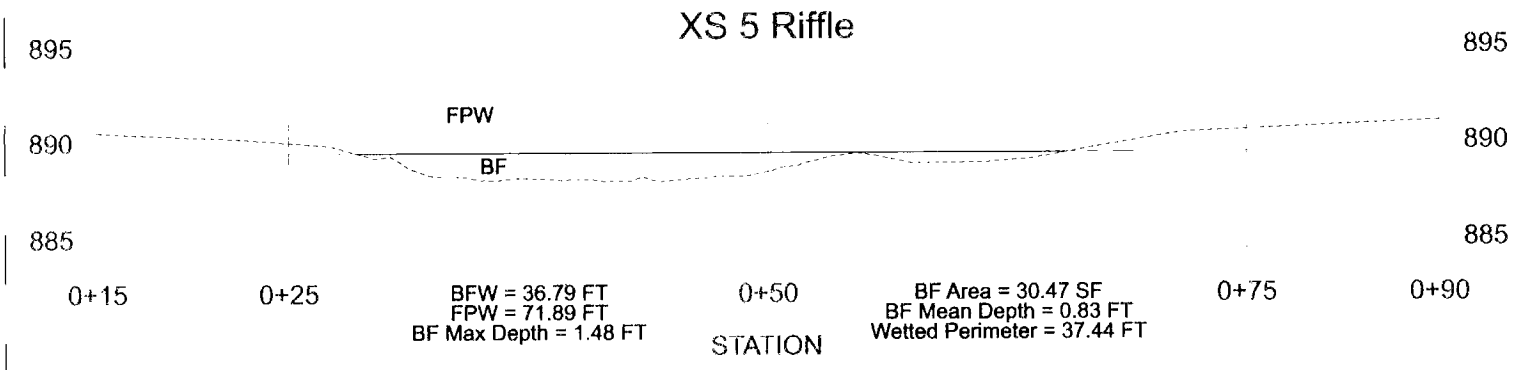




Cross Section Scale: 1"=10'

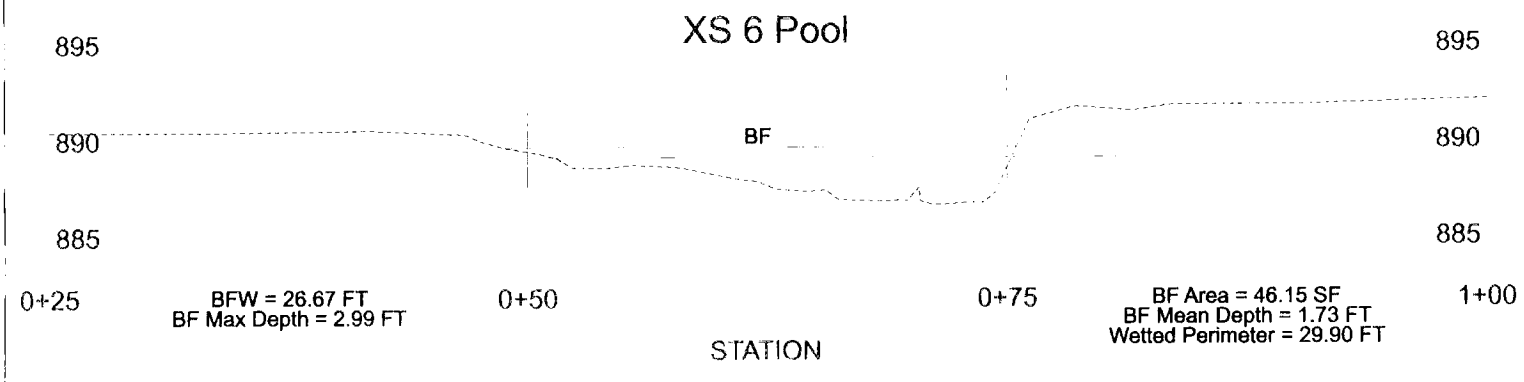
Kentucky Transportation	PROJECT: Town Branch Restoration			Existing Cross Sections	
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester	Cross Sections 1-4	Exhibit 2D (1)

Existing Mainline Cross Sections



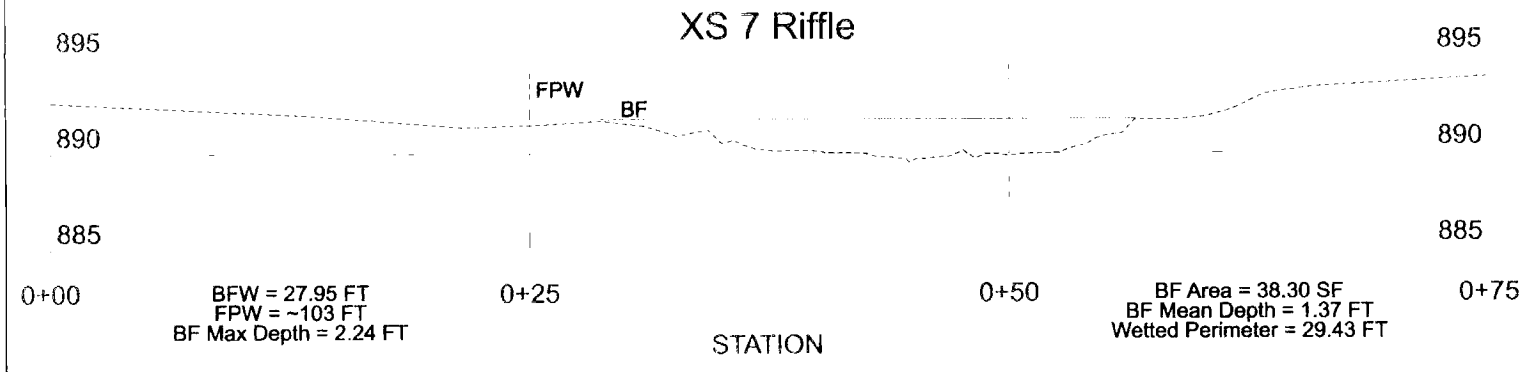
BFW = 36.79 FT
FPW = 71.89 FT
BF Max Depth = 1.48 FT

BF Area = 30.47 SF
BF Mean Depth = 0.83 FT
Wetted Perimeter = 37.44 FT



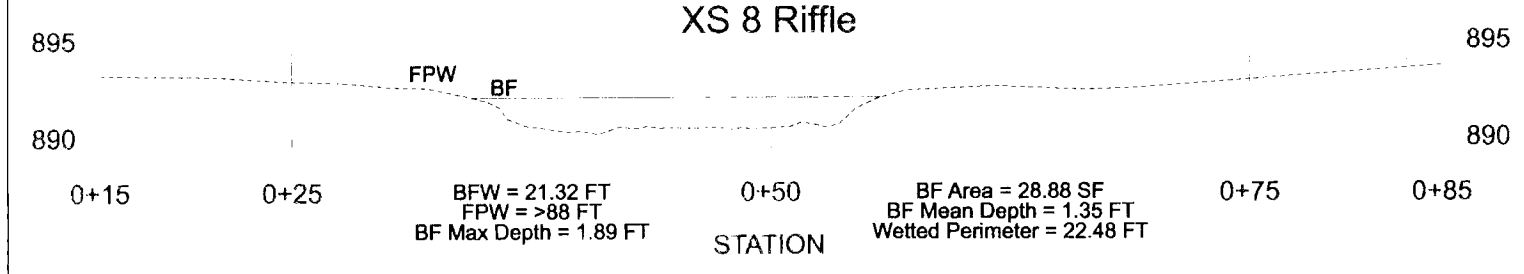
BFW = 26.67 FT
BF Max Depth = 2.99 FT

BF Area = 46.15 SF
BF Mean Depth = 1.73 FT
Wetted Perimeter = 29.90 FT



BFW = 27.95 FT
FPW = ~103 FT
BF Max Depth = 2.24 FT

BF Area = 38.30 SF
BF Mean Depth = 1.37 FT
Wetted Perimeter = 29.43 FT



BFW = 21.32 FT
FPW = >88 FT
BF Max Depth = 1.89 FT

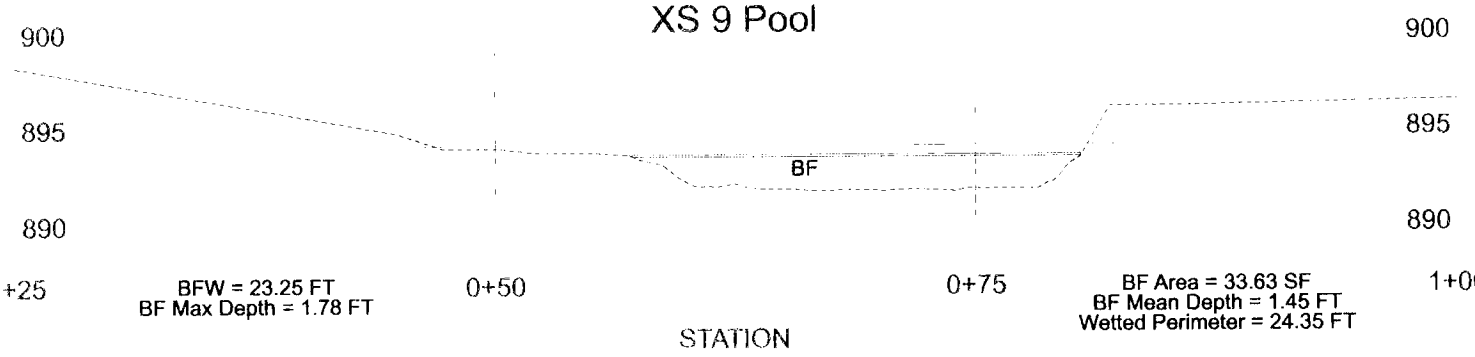
BF Area = 28.88 SF
BF Mean Depth = 1.35 FT
Wetted Perimeter = 22.48 FT

Cross Section Scale: 1"=10'

Kentucky Transportation	PROJECT: Town Branch Restoration			Existing Cross Sections	
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester	Cross Sections 5-8	Exhibit 2D (2)

Existing Mainline Cross Sections

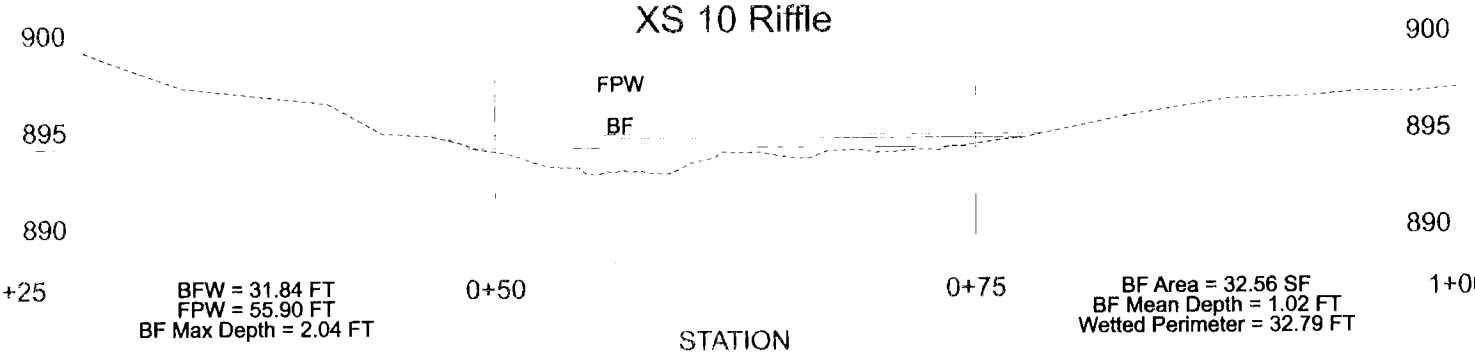
XS 9 Pool



BFW = 23.25 FT
BF Max Depth = 1.78 FT

BF Area = 33.63 SF
BF Mean Depth = 1.45 FT
Wetted Perimeter = 24.35 FT

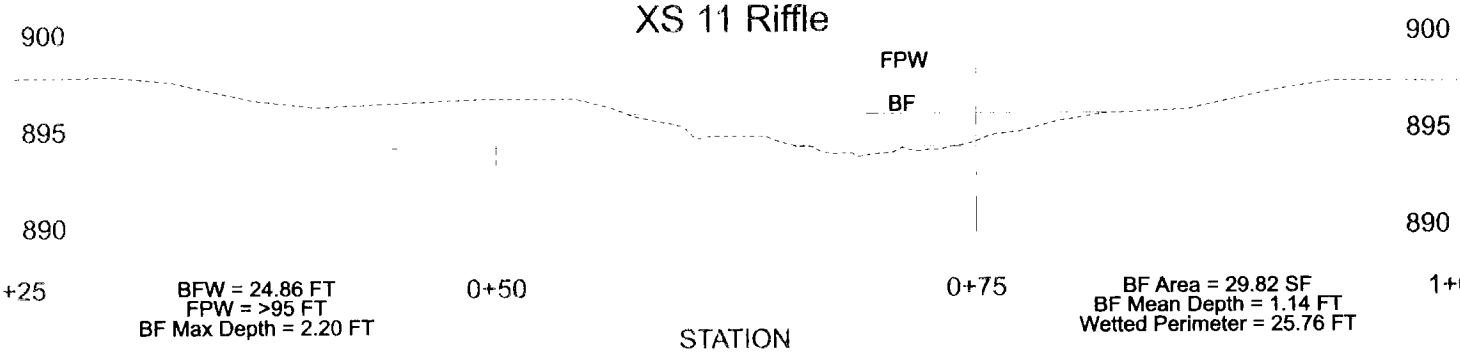
XS 10 Riffle



BFW = 31.84 FT
FPW = 55.90 FT
BF Max Depth = 2.04 FT

BF Area = 32.56 SF
BF Mean Depth = 1.02 FT
Wetted Perimeter = 32.79 FT

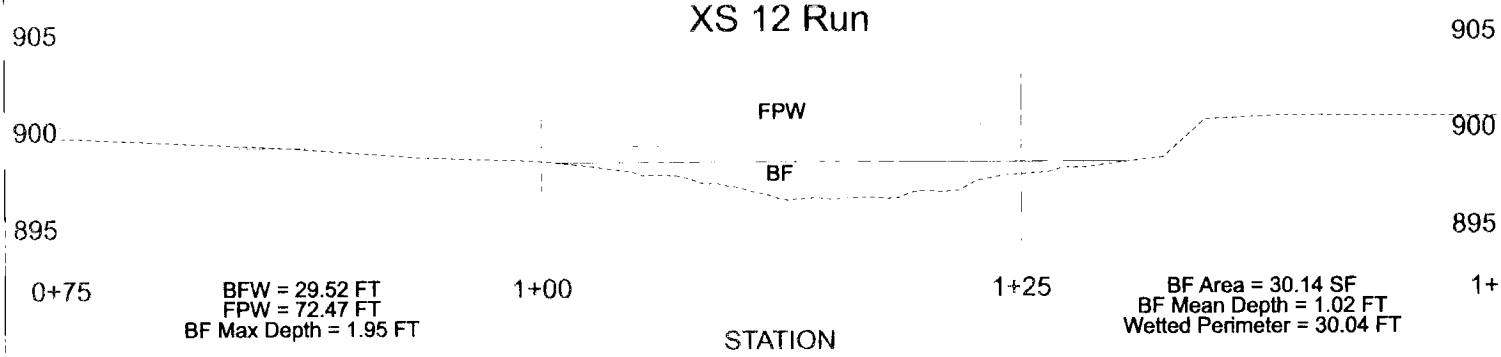
XS 11 Riffle



BFW = 24.86 FT
FPW = >95 FT
BF Max Depth = 2.20 FT

BF Area = 29.82 SF
BF Mean Depth = 1.14 FT
Wetted Perimeter = 25.76 FT

XS 12 Run



BFW = 29.52 FT
FPW = 72.47 FT
BF Max Depth = 1.95 FT

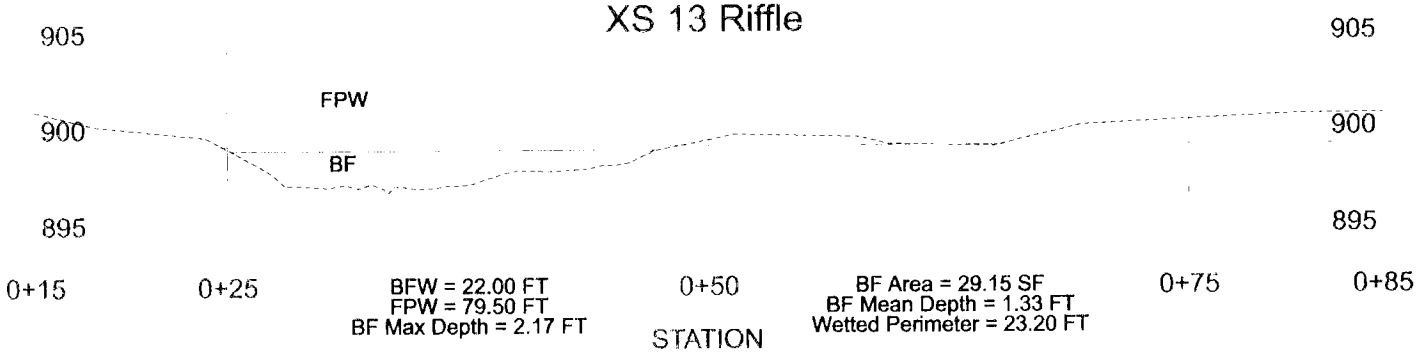
BF Area = 30.14 SF
BF Mean Depth = 1.02 FT
Wetted Perimeter = 30.04 FT

Cross Section Scale: 1"=10'

Kentucky Transportation	PROJECT: Town Branch Restoration			Existing Cross Sections	
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester	Cross Sections 9-12	Exhibit 2D (3)

Existing Mainline Cross Sections

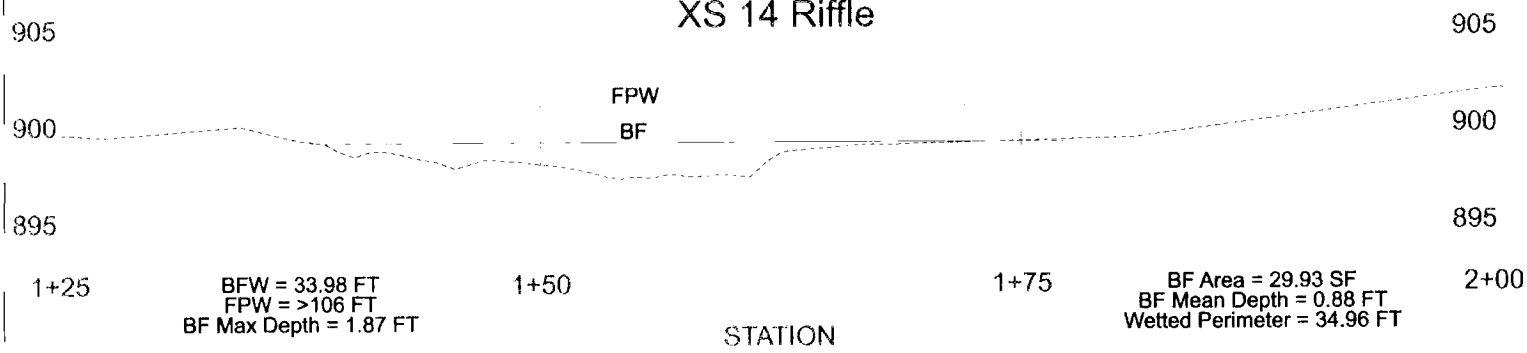
XS 13 Riffle



BFW = 22.00 FT
FPW = 79.50 FT
BF Max Depth = 2.17 FT

BF Area = 29.15 SF
BF Mean Depth = 1.33 FT
Wetted Perimeter = 23.20 FT

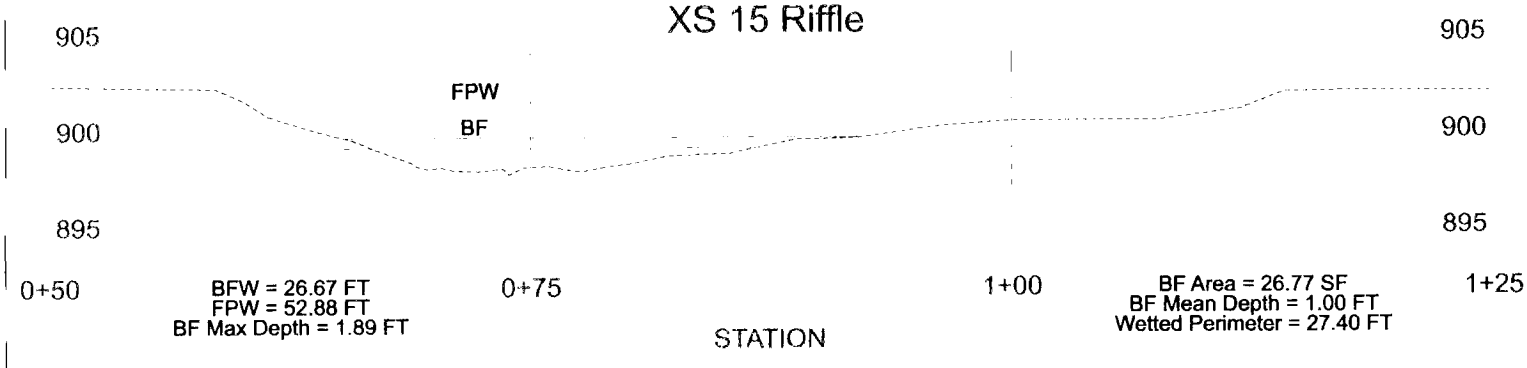
XS 14 Riffle



BFW = 33.98 FT
FPW = >106 FT
BF Max Depth = 1.87 FT

BF Area = 29.93 SF
BF Mean Depth = 0.88 FT
Wetted Perimeter = 34.96 FT

XS 15 Riffle



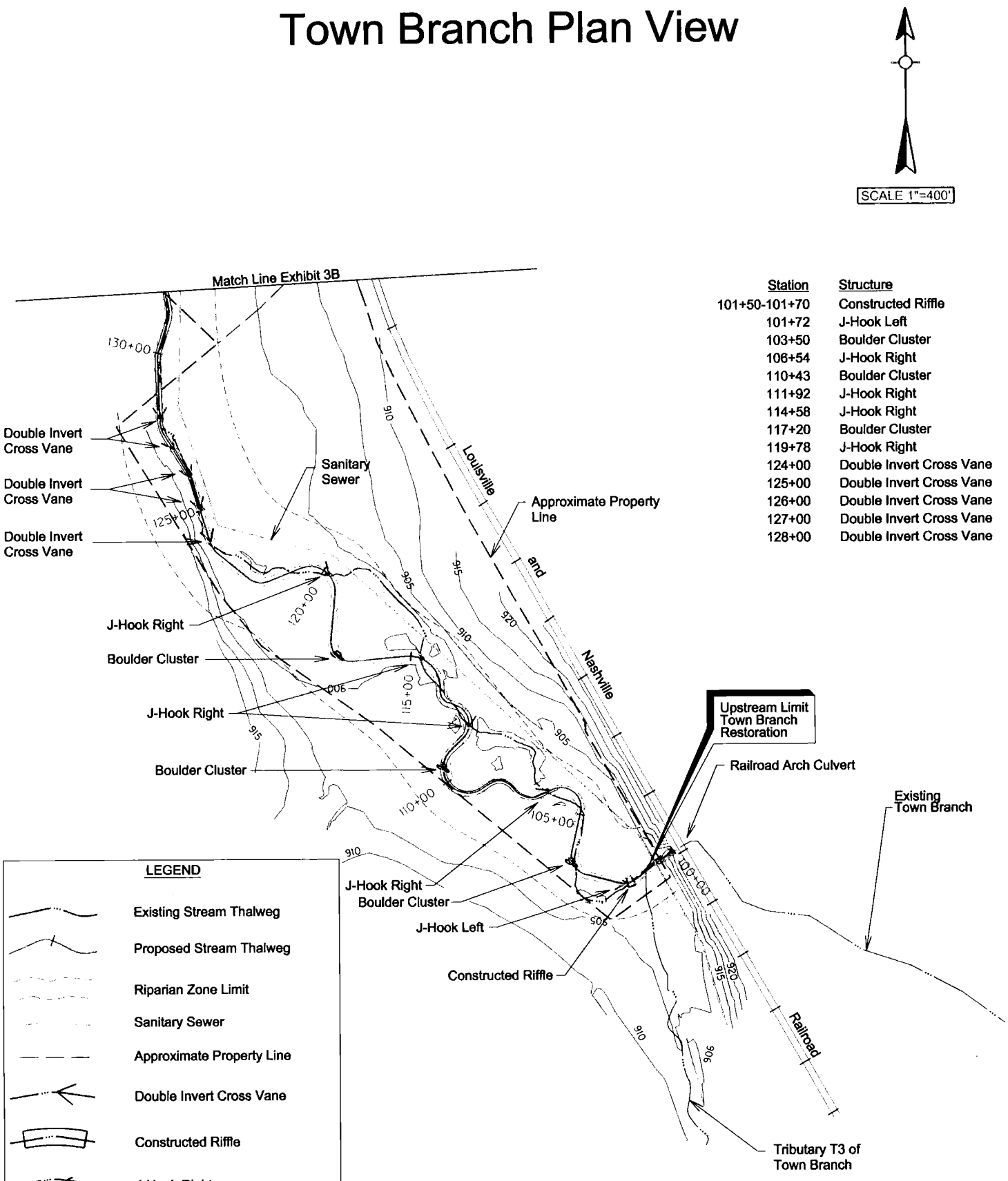
BFW = 26.67 FT
FPW = 52.88 FT
BF Max Depth = 1.89 FT

BF Area = 26.77 SF
BF Mean Depth = 1.00 FT
Wetted Perimeter = 27.40 FT

Cross Section Scale: 1"=10'

Kentucky Transportation	PROJECT: Town Branch Restoration			Existing Cross Sections	
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester	Cross Sections 13-15	Exhibit 20 (4)

Town Branch Plan View



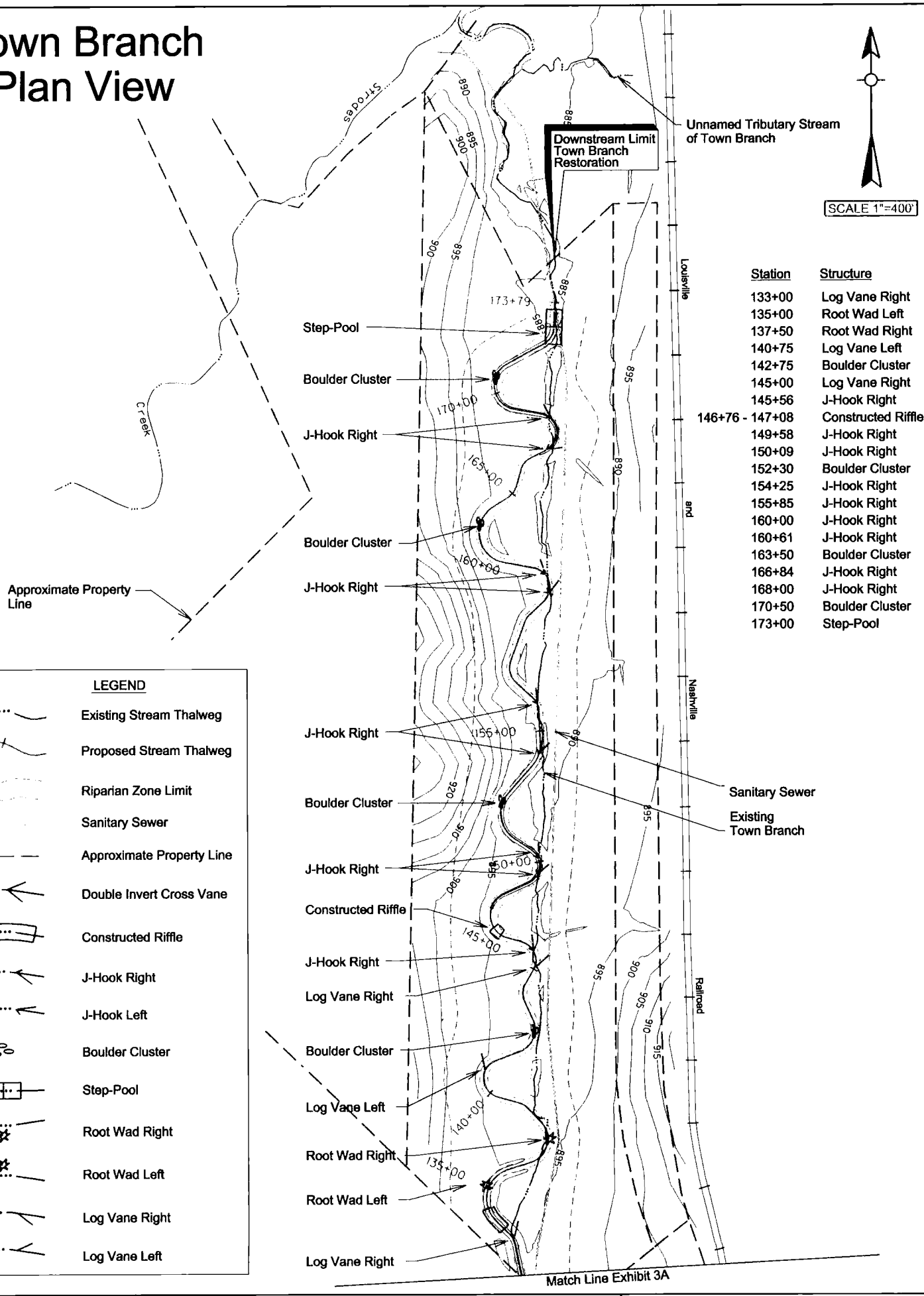
Station	Structure
101+50-101+70	Constructed Riffle
101+72	J-Hook Left
103+50	Boulder Cluster
106+54	J-Hook Right
110+43	Boulder Cluster
111+92	J-Hook Right
114+58	J-Hook Right
117+20	Boulder Cluster
119+78	J-Hook Right
124+00	Double Invert Cross Vane
125+00	Double Invert Cross Vane
126+00	Double Invert Cross Vane
127+00	Double Invert Cross Vane
128+00	Double Invert Cross Vane

LEGEND

- Existing Stream Thalweg
- Proposed Stream Thalweg
- Riparian Zone Limit
- Sanitary Sewer
- Approximate Property Line
- Double Invert Cross Vane
- Constructed Riffle
- J-Hook Right
- J-Hook Left
- Boulder Cluster

Kentucky Transportation	PROJECT: Town Branch Restoration			Stream: Town Branch	
	COUNTY: Clark	STATE: KENTUCKY	Near Winchester KY	Plan View	Exhibit 3A

Town Branch Plan View



Station	Structure
133+00	Log Vane Right
135+00	Root Wad Left
137+50	Root Wad Right
140+75	Log Vane Left
142+75	Boulder Cluster
145+00	Log Vane Right
145+56	J-Hook Right
146+76 - 147+08	Constructed Riffle
149+58	J-Hook Right
150+09	J-Hook Right
152+30	Boulder Cluster
154+25	J-Hook Right
155+85	J-Hook Right
160+00	J-Hook Right
160+61	J-Hook Right
163+50	Boulder Cluster
166+84	J-Hook Right
168+00	J-Hook Right
170+50	Boulder Cluster
173+00	Step-Pool

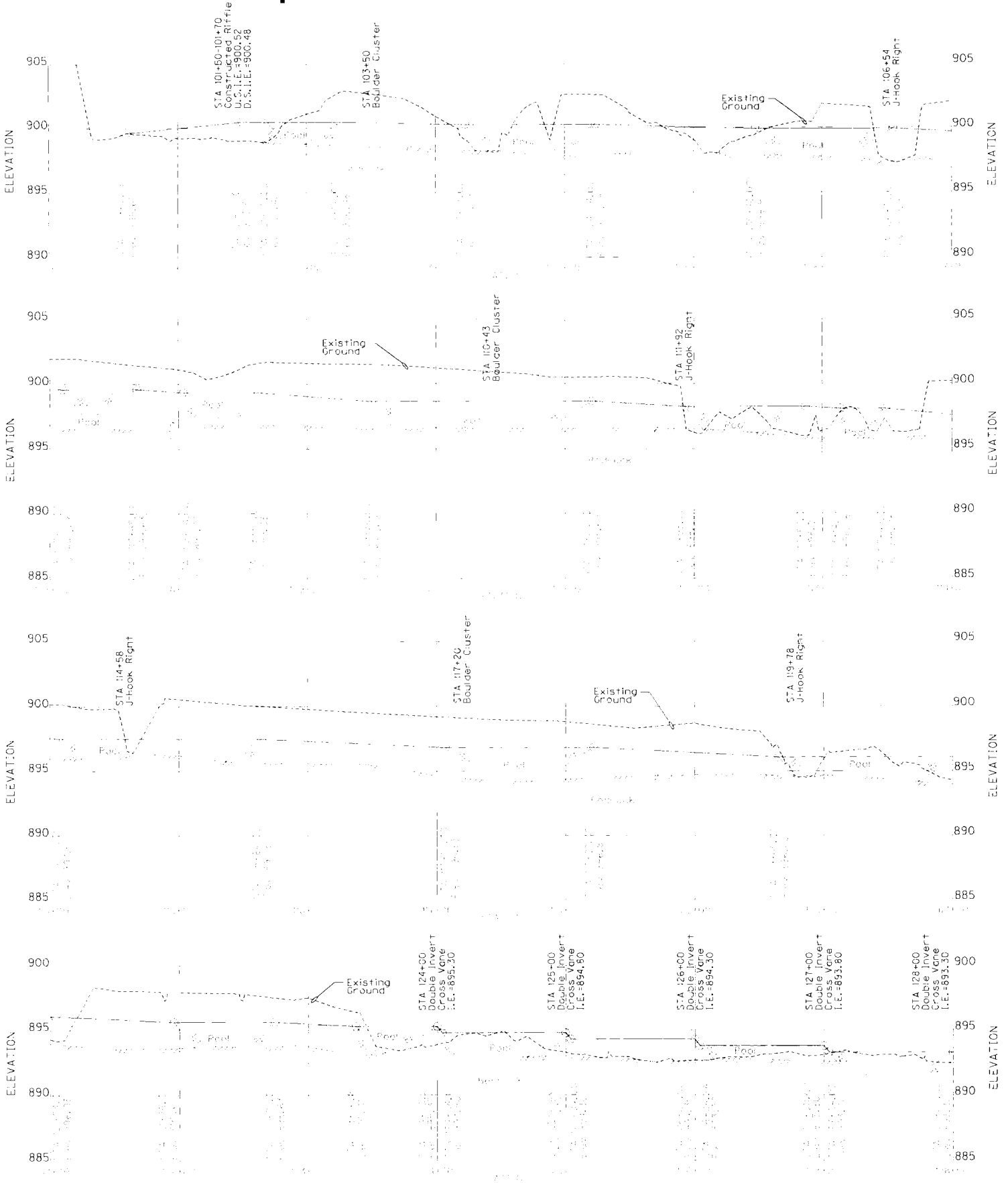
LEGEND

- Existing Stream Thalweg
- Proposed Stream Thalweg
- Riparian Zone Limit
- Sanitary Sewer
- Approximate Property Line
- Double Invert Cross Vane
- Constructed Riffle
- J-Hook Right
- J-Hook Left
- Boulder Cluster
- Step-Pool
- Root Wad Right
- Root Wad Left
- Log Vane Right
- Log Vane Left

Kentucky Transportation	PROJECT: Town Branch Restoration			Stream: Town Branch	
	COUNTY: Clark	STATE: KENTUCKY	Near Winchester KY	Plan View	Exhibit 3B

Proposed Town Branch Profile

Horz Scale: 1"=100'
Vert Scale: 1"=10'

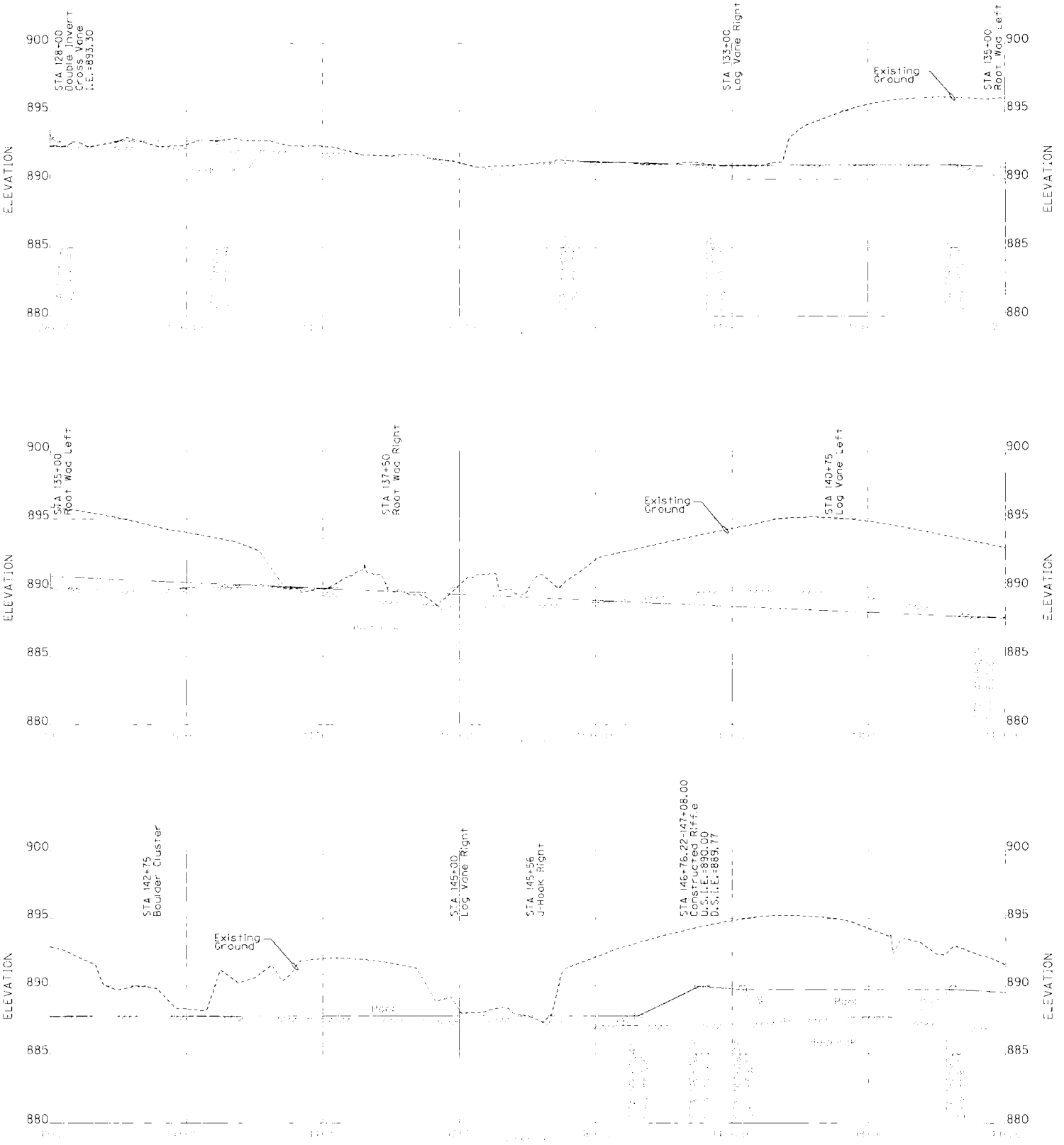


Note: For this exhibit, station to station locations labeled "Pool" include transitions to and from riffles (i.e. glides and runs) which, due to conditions incident to construction, will be defined during construction.

Kentucky Transportation	PROJECT: Town Branch Restoration		Town Branch Profile	
	COUNTY: Clark	STATE: KENTUCKY NEAR: Winchester	Profile: Sta 100+00 to Sta 128+00	Exhibit 3C (1)

Proposed Town Branch Profile

Horz Scale: 1"=100'
Vert Scale: 1"=10'

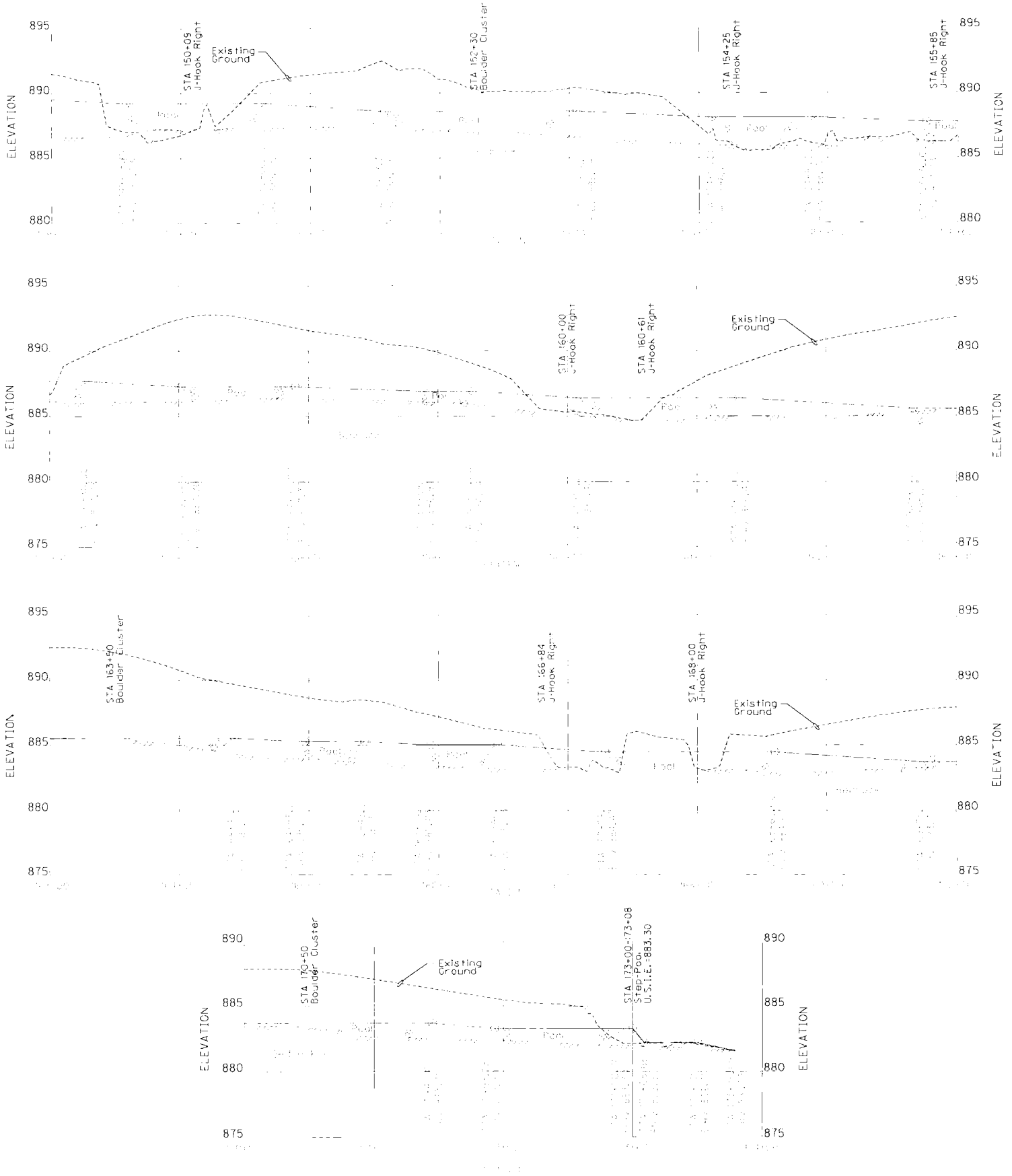


Note: For this exhibit, station to station locations labeled "Pool" include transitions to and from riffles (i.e. glides and runs) which, due to conditions incident to construction, will be defined during construction.

Kentucky Transportation	PROJECT: Town Branch Restoration		Town Branch Profile	
	COUNTY: Clark	STATE: KENTUCKY NEAR: Winchester	Profile: Sta 128+00 to Sta 149+00	Exhibit 3C (2)

Proposed Town Branch Profile

Horz Scale: 1"=100'
Vert Scale: 1"=10'

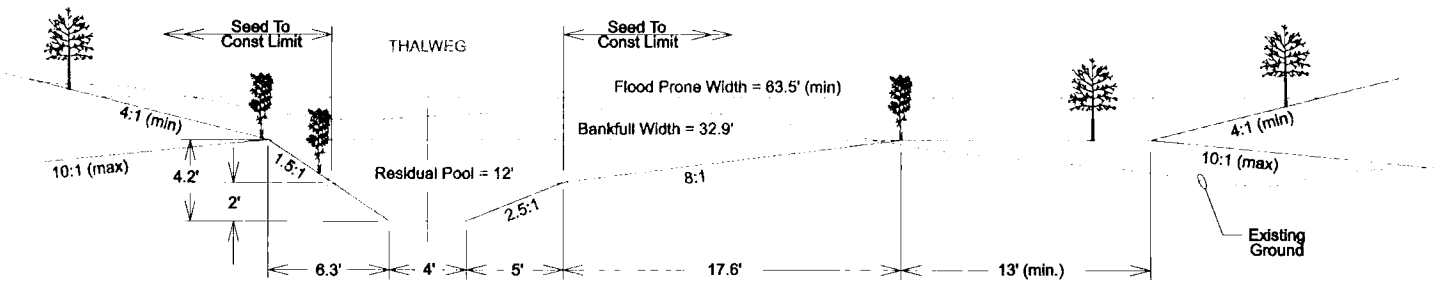


Note: For this exhibit, station to station locations labeled "Pool" include transitions to and from riffles (i.e. glides and runs) which, due to conditions incident to construction, will be defined during construction.

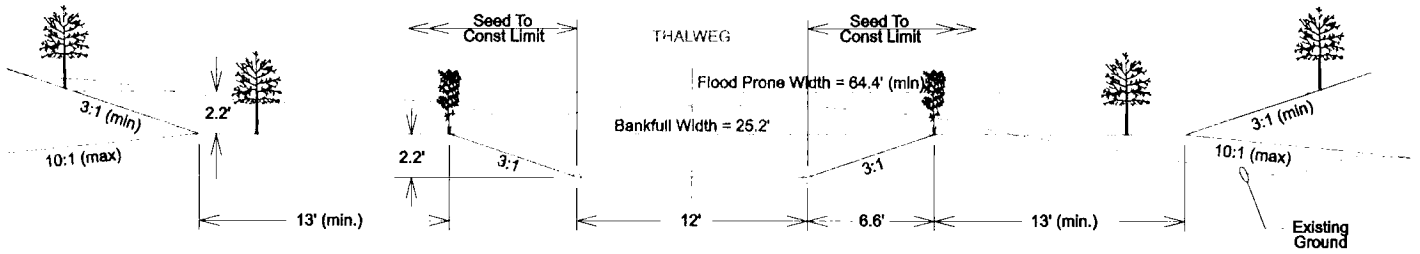
Kentucky Transportation	PROJECT: Town Branch Restoration		Town Branch Profile	
	COUNTY: Clark	STATE: KENTUCKY NEAR: Winchester	Profile: Sta 100+00 to Sta 128+00	Exhibit 30 (3)

Proposed Cross Sections

Downstream Reach



TYPICAL POOL

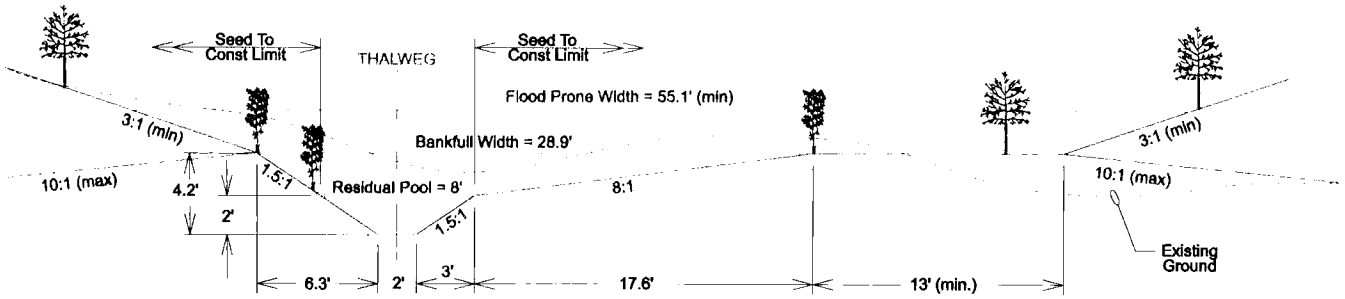


TYPICAL RIFFLE

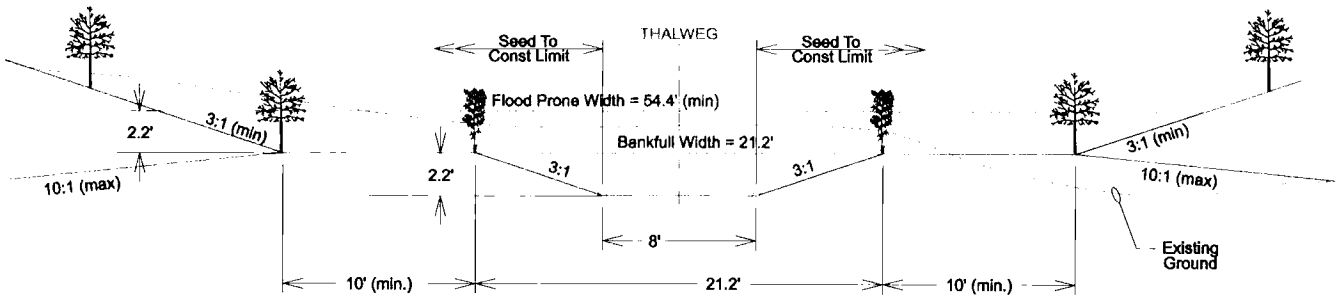
Bankfull Width - 25.20 FT
Bankfull Max Depth - 2.20 FT
Bankfull Mean Depth - 1.62 FT
Bankfull Area - 40.92 SF

Floodprone Width - 64.40 FT
Wetted Perimeter - 25.91 FT
Minimum Entrenchment Ratio - 2.56
Width to Depth Ratio - 15.56

Upstream Reach



TYPICAL POOL



TYPICAL RIFFLE

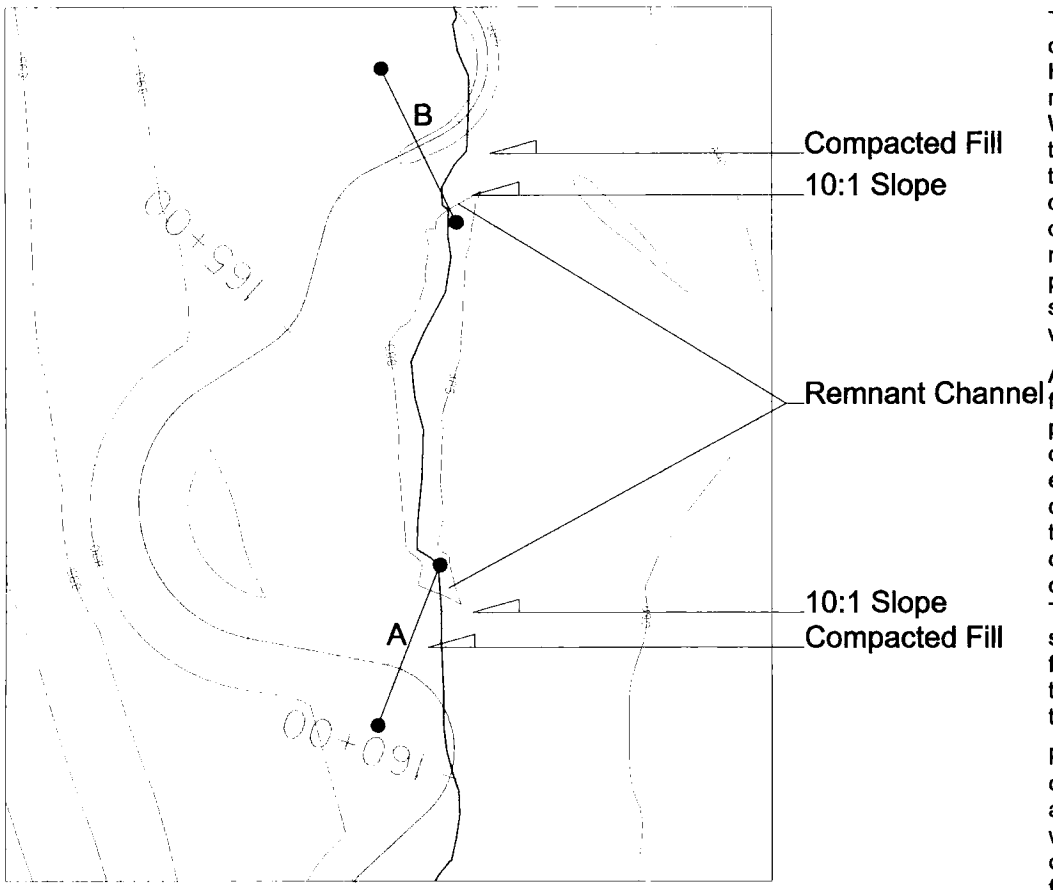
Bankfull Width - 21.20 FT
Bankfull Max Depth - 2.20 FT
Bankfull Mean Depth - 1.52 FT
Bankfull Area - 32.12 SF

Floodprone Width - 54.40 FT
Wetted Perimeter - 21.91 FT
Minimum Entrenchment Ratio - 2.57
Width to Depth Ratio - 13.95

Kentucky Transportation	PROJECT: Town Branch Restoration			Proposed Cross Sections	
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester		Exhibit 3D

Remnant Channel Detail

Not To Scale

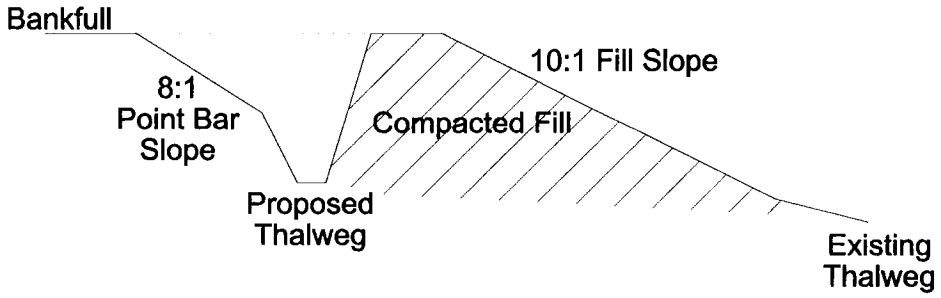


The existing channel may be used to dispose of excess earth and rock. However, the existing channel shall remain in place at all locations possible. Where the proposed channel intersects the existing channel, fill material utilized to consturct the new channel shall be compacted and stabilized. Fill slopes outside the proposed channel shall be no steeper than 10:1. Within the proposed channel, bank stabilization structures such as j-hooks can be utilized when necessary.

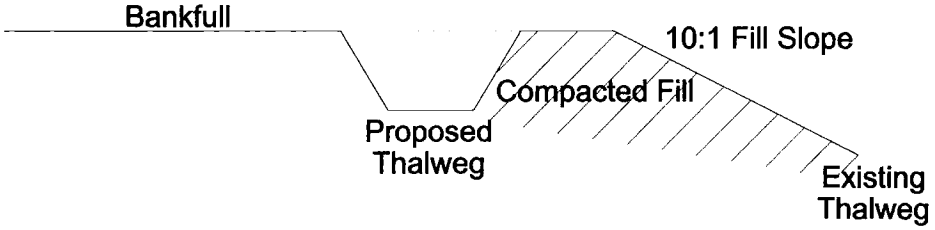
A channel may be formed as an outlet from the remnant channel to acces the proposed channel. This channel shall only be constructed on the downstream end of the remnent channel. The outlet channel shall be no deeper than 1/3 of the bankfull depth of the proposed channel at the point where the outlet channel ties to the proposed channel. The bottom width of the outlet channel shall be 5 feet, minumum. Sides slopes for the outlet channel shall be no steeper than 4:1 and shall be graded for smooth transistion to the proposed landscape.

Portions of the remnant channel may contain water permanently. This is acceptable and allows for habitat diversity within the riparian zone. During periods of high flow the remnant channel will function as storage areas. Aquatic and other wildlife will utilize these areas. Trees and shrubs for proposed riparian plantings shall not be placed so as to endure expected permanent inundation unless the species are tolerant to those conditions. Plantings near the remnant channel shall be tolerant of moist conditions, having a wetland indicator status of facultative or wetter.

Detail Section 'A'
(Facing Downstream)



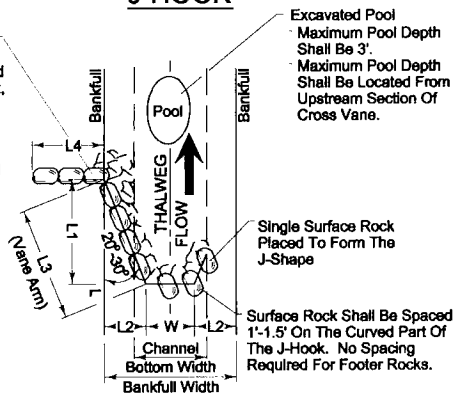
Detail Section 'B'
(Facing Downstream)



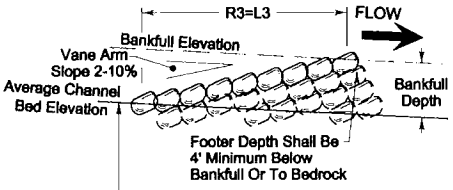
Sections Not To Scale. Vertical : Horizontal Exaggeration Factor 5.

Kentucky Transportation	PROJECT: Town Branch Restoration			Remnant Channel Details	
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester		Exhibit 3E

J-HOOK

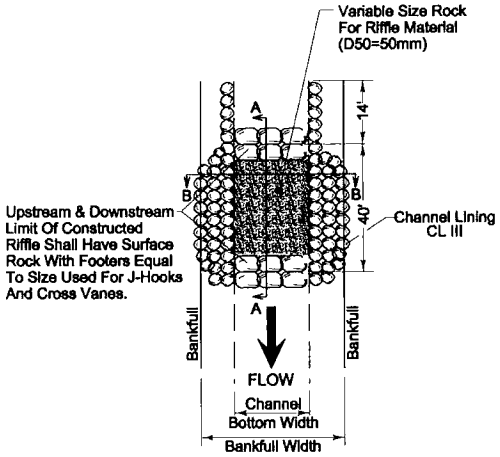


(Plan View)

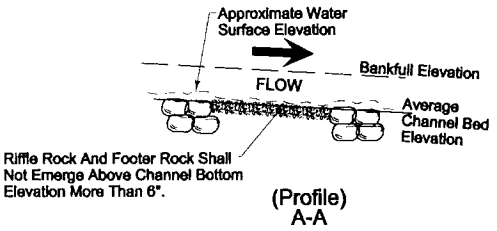


(Profile)

CONSTRUCTED RIFFLE



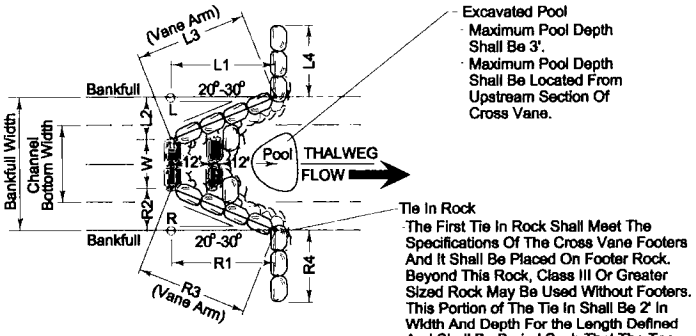
(Plan View)



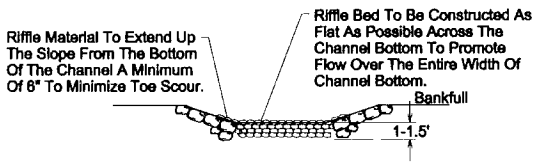
(Profile)
A-A

- Footer Rock Shall Be Placed To A Mimimum Depth Of 3' Below The Channel Bed Elevation.

DOUBLE INVERT CROSS VANE

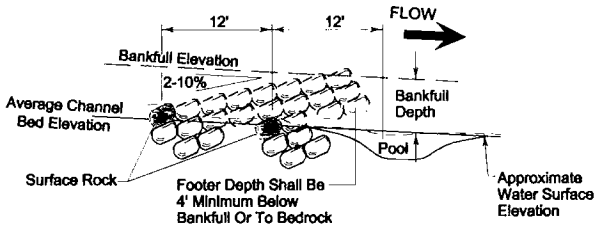


(Plan View)



(Cross Section)
B-B

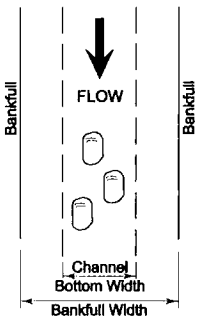
- Riffle Rock Shall Be Placed To A Minimum Depth Of 1' Below The Channel Bed Elevation Not To Exceed 1.5'.



Top Of Cross-Vane Across Width (W) Is Level. Surface Rock In This Level (Upstream) Portion Is 0.5' (Maximum) Above Thalweg Of Channel.

(Profile)

BOULDER CLUSTER



(Plan View)

Boulders shall be a minimum of 3' in length, 2'-3' in width and a minimum thickness of 1'.

Boulders shall be placed in a random pattern near the center of channel with at least 3 boulders per cluster.

Boulders shall be spaced 0.5' to 2' apart and shall be placed a minimum distance of 1' from channel side slope.

Boulders shall be buried into channel bottom and shall be positioned with the long axis parallel to flow. Overhangs, pockets and crevices should be left exposed as much as possible.

Kentucky Transportation	PROJECT: Town Branch Restoration		Structure Detail Examples	
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester	Exhibit 3F

Exhibit 4 – Photographs of Town Branch

Assessment Point A1 – Looking Upstream

Assessment Point A1 – Looking Downstream

Assessment Point A2 – Looking Upstream

Assessment Point A2 – Looking Downstream

Assessment Point A3 – Looking Upstream

Assessment Point A3 – Looking Downstream

Assessment Point A4 – Looking Upstream

Assessment Point A4 – Looking Downstream

Assessment Point A5 – Looking Upstream

Assessment Point A5 – Looking Downstream

Assessment Point A6 – Looking Upstream

Assessment Point A6 – Looking Downstream

Exhibit 5

Soil Map–Clark County, Kentucky
(Town Branch Restoration Area)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clark County, Kentucky
Survey Area Data: Version 6, Dec 12, 2007

Date(s) aerial images were photographed: 1997

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Clark County, Kentucky (KY049)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AsB	Ashton silt loam, 2 to 6 percent slopes	2.8	2.7%
BhB	Brashear silt loam, 2 to 6 percent slopes	5.6	5.5%
BhC2	Brashear silt loam, 6 to 12 percent slopes, eroded	0.6	0.5%
CaB	Captina silt loam, 2 to 6 percent slopes (otwell)	0.8	0.8%
HmB	Hampshire silt loam, 2 to 6 percent slopes (lowell)	0.0	0.0%
HmC	Hampshire silt loam, 6 to 12 percent slopes (lowell)	2.6	2.5%
HmC2	Hampshire silt loam, 6 to 12 percent slopes, eroded (lowell)	8.0	7.8%
Hs	Huntington silt loam	10.2	9.9%
Ne	Newark silt loam	59.0	57.6%
ScC2	Salvisa silty clay loam, 6 to 12 percent slopes, eroded	1.7	1.7%
ScD2	Salvisa silty clay loam, 12 to 20 percent slopes, eroded	11.1	10.9%
Totals for Area of Interest (AOI)		102.4	100.0%

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: *Town Branch*			LOCATION: *A 1*
STATION:	DRAINAGE AREA (AC)	*>2560*	BASIN/WATERSHED *Licking River*
LAT: *38-01-01.1*	LONG: *84-11-25.7*		COUNTY; *Clark* USGS 7.5 TOPO; *Austerlitz*
DATE: *4-23-08*	TIME: __:__ ☐ AM ☑ PM		INVESTIGATORS; *Rob Lewis, Julie Clark*

TYPE SAMPLE: ☐ P-CHEM ☐ Macroinvertebrate ☐ FISH ☐ BACT.

WEATHER: Now / Past 24 hours

- ☐ / ☐ Heavy rain
- ☐ / ☐ Steady rain
- ☐ / ☐ Intermittent showers
- ☑ / ☑ Clear/sunny

Has there been a heavy rain in the last 7 days? ☐ Yes ☑ No

Air temperature *80* °F. Inches rainfall in past 24 hours ___ in

0 % Cloud Cover

P-Chem: Temp (°C) *21.2* D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs _____ ☐ Grab

INSTREAM WATERSHED FEATURES

Stream Width EOW	*12.0*	ft
Stream Width BF	*34.0*	ft
Range of Depth	*0.2-1.5*	ft
Discharge		cfs
Est. Reach Length		ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewers

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow; ☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type; ☑ Perennial ☐ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type: ☑ Trees ☐ Shrubs ☐ Grasses ☑ Herbaceous

Number of Strata *2*

Dom. Tree/Shrub Taxa: *Osage orange*, *Black Locust*

Canopy Cover; ☑ Fully Exposed (0-25%) ☐ Partially Exposed (25-50%) ☐ Partially Shaded (50-75%) ☐ Fully Shaded (75-100%)

Channel Alterations; ☐ Dredging ☐ Channelization (☐ Full ☐ Partial)

Substrate ☑ Est. ☐ P.C	Riffle *20* %	Run; _____ %	Pool *80* %
Silt/Clay (<0.06 mm)	*20*		*40*
Sand (0.06-2 mm)			
Gravel (2-64 mm)			
Cobble (64-256 mm)	*20*		*20*
Boulders (>256 mm)			
Bedrock	60		*40*

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**

Total Score 108

NOTES/COMMENTS; Erosion on outside bends, lateral migration evident

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: *Town Branch*			LOCATION: *A 2*
STATION:	DRAINAGE AREA (AC)	*>2560*	BASIN/WATERSHED *Licking River*
LAT: *38-01-05.0*	LONG: *84-11-31.8*		COUNTY; *Clark* USGS 7.5 TOPO; *Austerlitz*
DATE: *4-23-08*	TIME: __:__ ☐ AM ☑ PM		INVESTIGATORS; *Rob Lewis, Julie Clark*

TYPE SAMPLE: ☐ P-CHEM ☐ Macroinvertebrate ☐ FISH ☐ BACT.

WEATHER:

Now	Past 24 hours	Has there been a heavy rain in the last 7 days?
☐	☐ Heavy rain	☐ Yes ☑ No
☐	☐ Steady rain	Air temperature *80* °F. Inches rainfall in past 24 hours ___ in
☐	☐ Intermittent showers	*0* % Cloud Cover
☑	☑ Clear/sunny	

P-Chem: Temp (°C) *23.4* D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs _____ ☐ Grab

INSTREAM WATERSHED FEATURES

Stream Width EOW	*14.0*	ft
Stream Width BF	*26.0*	ft
Range of Depth	*0.2-1.0*	ft
Discharge		cfs
Est. Reach Length		ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewers

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments ☐ Island ☐ Waterfalls ☐ Other ☐ Culverts

Stream Flow;
☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type;
☑ Perennial ☐ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☐ Trees ☑ Shrubs ☐ Grasses ☑ Herbaceous
Number of Strata *2*

Dom. Tree/Shrub Taxa
Osage orange

Canopy Cover;
☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations;
☐ Dredging
☐ Channelization (☐ Full ☐ Partial)

Substrate ☑ Est. ☐ P.C	Riffle *20* %	Run; _____ %	Pool *80* %
Silt/Clay (<0.06 mm)	*20*		*60*
Sand (0.06-2 mm)			
Gravel (2-64 mm)	*30*		
Cobble (64-256 mm)	*40*		*30*
Boulders (>256 mm)			
Bedrock	*10*		*10*

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
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SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score lo	Dominated by 1 velocity/depth regime.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
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SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
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SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**

Total Score 98

NOTES/COMMENTS;

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: *Town Branch*			LOCATION: *A 3*
STATION:	DRAINAGE AREA (AC)	*>2560*	BASIN/WATERSHED *Licking River*
LAT: *38-01-09.3*	LONG: *84-11-39.8*		COUNTY; *Clark* USGS 7.5 TOPO; *Austerlitz*
DATE: *4-23-08*	TIME: __:__ ☐ AM ☑ PM		INVESTIGATORS; *Rob Lewis, Julie Clark*

TYPE SAMPLE: ☐ P-CHEM ☐ Macroinvertebrate ☐ FISH ☐ BACT.

WEATHER:

Now	Past 24 hours	Has there been a heavy rain in the last 7 days?
☐	☐ Heavy rain	☐ Yes ☑ No
☐	☐ Steady rain	Air temperature *80* °F. Inches rainfall in past 24 hours ___ in
☐	☐ Intermittent showers	*0* % Cloud Cover
☑	☑ Clear/sunny	

P-Chem: Temp (°C) *24.9* D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs _____ ☐ Grab

INSTREAM WATERSHED FEATURES

Stream Width EOW	*9.0*	ft
Stream Width BF	*32.0*	ft
Range of Depth	*0.2-0.6*	ft
Discharge		cfs
Est. Reach Length		ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewers

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments ☐ Island ☐ Waterfalls ☐ Other ☐ Culverts

Stream Flow;
☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type;
☑ Perennial ☐ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☑ Trees ☐ Shrubs ☐ Grasses ☑ Herbaceous
Number of Strata *2*

Dom. Tree/Shrub Taxa
Osage orange

Canopy Cover;
☐ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☑ Fully Shaded (75-100%)

Channel Alterations;
☐ Dredging
☐ Channelization (☐ Full ☐ Partial)

Substrate ☑ Est. ☐ P.C	Riffle *20* %	Run; _____ %	Pool *80* %
Silt/Clay (<0.06 mm)	*20*		*30*
Sand (0.06-2 mm)			
Gravel (2-64 mm)	*20*		*30*
Cobble (64-256 mm)	*50*		*40*
Boulders (>256 mm)			
Bedrock	*10*		*Ledge rock on one bank*

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 **11**	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.
SCORE	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	**20 19 18 17 16**	**15 14 13 12 (11)**	**10 9 8 7 6**	**5 4 3 2 1 0**
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	**20 19 18 (17) 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	**20 19 18 17 16**	**(15) 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 (6)**	**5 4 3 2 1 0**
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**(5) 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**(5) 4 3**	**2 1 0**
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**(5) 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**(5) 4 3**	**2 1 0**
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**(2) 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**(2) 1 0**

Total Score

NOTES/COMMENTS;

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: *Town Branch*			LOCATION: *A 4*
STATION:	DRAINAGE AREA (AC)	*>2560*	BASIN/WATERSHED *Licking River*
LAT: *38-01-21.2*	LONG: *84-11-40.5*		COUNTY; *Clark* USGS 7.5 TOPO; *Austerlitz*
DATE: *4-23-08*	TIME: __:__ ☐ AM ☑ PM		INVESTIGATORS; *Rob Lewis, Julie Clark*

TYPE SAMPLE: ☐ P-CHEM ☐ Macroinvertebrate ☐ FISH ☐ BACT.

WEATHER: Now / Past 24 hours

- ☐ / ☐ Heavy rain
- ☐ / ☐ Steady rain
- ☐ / ☐ Intermittent showers
- ☑ / ☑ Clear/sunny

Has there been a heavy rain in the last 7 days? ☐ Yes ☑ No

Air temperature *80* °F. Inches rainfall in past 24 hours ___ in

0 % Cloud Cover

P-Chem: Temp (°C) *24.9* D.O. (mg/l) ____ % Saturation ____ pH(S.U.) ____ Cond.µs ____ ☐ Grab

INSTREAM WATERSHED FEATURES

Stream Width EOW	*13.0*	ft
Stream Width BF	*27.0*	ft
Range of Depth	*0.2-1.5*	ft
Discharge		cfs
Est. Reach Length		ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewers

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments ☐ Island ☐ Waterfalls ☐ Other ☐ Culverts

Stream Flow;
☐ Dry ☐ Pooled ☐ Low ☑ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type;
☑ Perennial ☐ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☐ Trees ☑ Shrubs ☐ Grasses ☑ Herbaceous
Number of Strata *2*

Dom. Tree/Shrub Taxa
Osage orange
Honey locust

Canopy Cover;
☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations;
☐ Dredging
☑ Channelization (☑ Full ☐ Partial)

Substrate ☑ Est. ☐ P.C	Riffle *30* %	Run; *20* %	Pool *50* %
Silt/Clay (<0.06 mm)	*10*		*30*
Sand (0.06-2 mm)			
Gravel (2-64 mm)	*30*	*25*	*30*
Cobble (64-256 mm)	*30*	*25*	*30*
Boulders (>256 mm)			
Bedrock	*30*	*50*	*10*

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 **11**	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 **11**	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.
SCORE	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	**20 19 18 17 16**	**15 14 (13) 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	**20 19 18 17 (16)**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	**20 19 18 17 16**	**(15) 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 (6)**	**5 4 3 2 1 0**
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 (4) 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 (4) 3**	**2 1 0**
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 (4) 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 (4) 3**	**2 1 0**
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**(2) 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**(2) 1 0**

Total Score

NOTES/COMMENTS;

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: *Town Branch*			LOCATION: *A 5*
STATION:	DRAINAGE AREA (AC)	*>2560*	BASIN/WATERSHED *Licking River*
LAT: *38-01-31.1*	LONG: *84-11-40.4*		COUNTY; *Clark* USGS 7.5 TOPO; *Austerlitz*
DATE: *4-23-08*	TIME: __:__ ☐ AM ☑ PM		INVESTIGATORS; *Rob Lewis, Julie Clark*

TYPE SAMPLE: ☐ P-CHEM ☐ Macroinvertebrate ☐ FISH ☐ BACT.

WEATHER:

Now	Past 24 hours
☐	☐ Heavy rain
☐	☐ Steady rain
☐	☐ Intermittent showers
☑	☑ Clear/sunny

Has there been a heavy rain in the last 7 days? ☐ Yes ☑ No

Air temperature *80* °F. Inches rainfall in past 24 hours ___ in

0 % Cloud Cover

P-Chem: Temp (°C) *26.5* D.O. (mg/l) ____ % Saturation ____ pH(S.U.) ____ Cond.µs ____ ☐ Grab

INSTREAM WATERSHED FEATURES

Stream Width EOW	*8.0*	ft
Stream Width BF	*32.0*	ft
Range of Depth	*0.2-0.5*	ft
Discharge		cfs
Est. Reach Length		ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewers

Hydraulic Structures:
☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow;
☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type;
☑ Perennial ☐ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:
Dominate Type:
☑ Trees ☐ Shrubs
☐ Grasses ☑ Herbaceous
Number of Strata *2*

Dom. Tree/Shrub Taxa
Osage orange

Canopy Cover;
☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations;
☐ Dredging
☑ Channelization
(☑ Full ☐ Partial)

Substrate ☑ Est. ☐ P.C	Riffle *20* %	Run; *20* %	Pool *60* %
Silt/Clay (<0.06 mm)	*10*	*10*	*20*
Sand (0.06-2 mm)			
Gravel (2-64 mm)	*20*	*20*	*20*
Cobble (64-256 mm)	*40*	*40*	*20*
Boulders (>256 mm)			
Bedrock	*30*	*30*	*40*

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**

Total Score 108

NOTES/COMMENTS;

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: *Town Branch*			LOCATION: *A 6*
STATION:	DRAINAGE AREA (AC)	*>2560*	BASIN/WATERSHED *Licking River*
LAT: *38-01-44.8*	LONG: *84-11-39.8*		COUNTY; *Clark* USGS 7.5 TOPO; *Austerlitz*
DATE: *4-23-08*	TIME: _:_ ☐ AM ☑ PM		INVESTIGATORS; *Rob Lewis, Julie Clark*

TYPE SAMPLE: ☐ P-CHEM ☐ Macroinvertebrate ☐ FISH ☐ BACT.

WEATHER: Now / Past 24 hours

- ☐ / ☐ Heavy rain
- ☐ / ☐ Steady rain
- ☐ / ☐ Intermittent showers
- ☑ / ☑ Clear/sunny

Has there been a heavy rain in the last 7 days? ☐ Yes ☑ No

Air temperature *80* °F. Inches rainfall in past 24 hours ___ in

0 % Cloud Cover

P-Chem: Temp (°C) *29.3* D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond.µs _____ ☐ Grab

INSTREAM WATERSHED FEATURES

Stream Width EOW	*24.0*	ft
Stream Width BF	*29.0*	ft
Range of Depth	*0.5-1.5*	ft
Discharge		cfs
Est. Reach Length		ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining	☐ Construction	☐ Forest
☐ Deep Mining	☐ Commercial	☑ Pasture/Grazing
☐ Oil Wells	☐ Industrial	☐ Silviculture
☐ Land Disposal	☐ Row Crops	☐ Urban Runoff/Storm Sewers

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other ☐ Culverts

Stream Flow;

☐ Dry ☐ Pooled ☐ Low ☑ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type;

☑ Perennial ☐ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominate Type:
☑ Trees ☐ Shrubs
☐ Grasses ☑ Herbaceous

Number of Strata *2*

Dom. Tree/Shrub Taxa
Osage orange
Honey locust

Canopy Cover;

☑ Fully Exposed (0-25%)
☐ Partially Exposed (25-50%)
☐ Partially Shaded (50-75%)
☐ Fully Shaded (75-100%)

Channel Alterations;

☐ Dredging
☑ Channelization (☑ Full ☐ Partial)

Substrate ☑ Est. ☐ P.C	Riffle *30* %	Run; *20* %	Pool *50* %
Silt/Clay (<0.06 mm)	*20*	*20*	*30*
Sand (0.06-2 mm)	*10*	*10*	*10*
Gravel (2-64 mm)	*60*	*60*	*50*
Cobble (64-256 mm)	*10*	*10*	
Boulders (>256 mm)			
Bedrock			*10*

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1 0**
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	**Left Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**
SCORE (RB)	**Right Bank 10 9**	**8 7 6**	**5 4 3**	**2 1 0**

Total Score **84**

NOTES/COMMENTS;

Appendix 2

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION: JD for Town Branch of Strodes Creek
State:Kentucky County/parish/borough: Clark City: Winchester
Center coordinates of site (lat/long in degree decimal format): Lat. 38.0300° **N**, Long. 84.1944° **W**.
Universal Transverse Mercator: 16 746245E 4212848N (NAD83/WGS84)
Name of nearest waterbody: Town Branch of Strodes Creek
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Licking River
Name of watershed or Hydrologic Unit Code (HUC): 05100102-030-010 (14 digit HUC)
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☒ Field Determination. Date(s): 10/10/07

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Pick List** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☐ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: 6137 linear feet: 6-12 width (ft) and/or acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Established by OHWM.**
      Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain: .

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: .

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: 48.81 inches
   Average annual snowfall: 10.80 inches

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

---

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: Based on watershed (4 sq.miles) and channel size (6-15 ft.), flow occurs year-round. Additionally, the 2-year discharge is 423 cfs., a large flow rating for such an event.
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: **6137** linear feet **6-12** width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

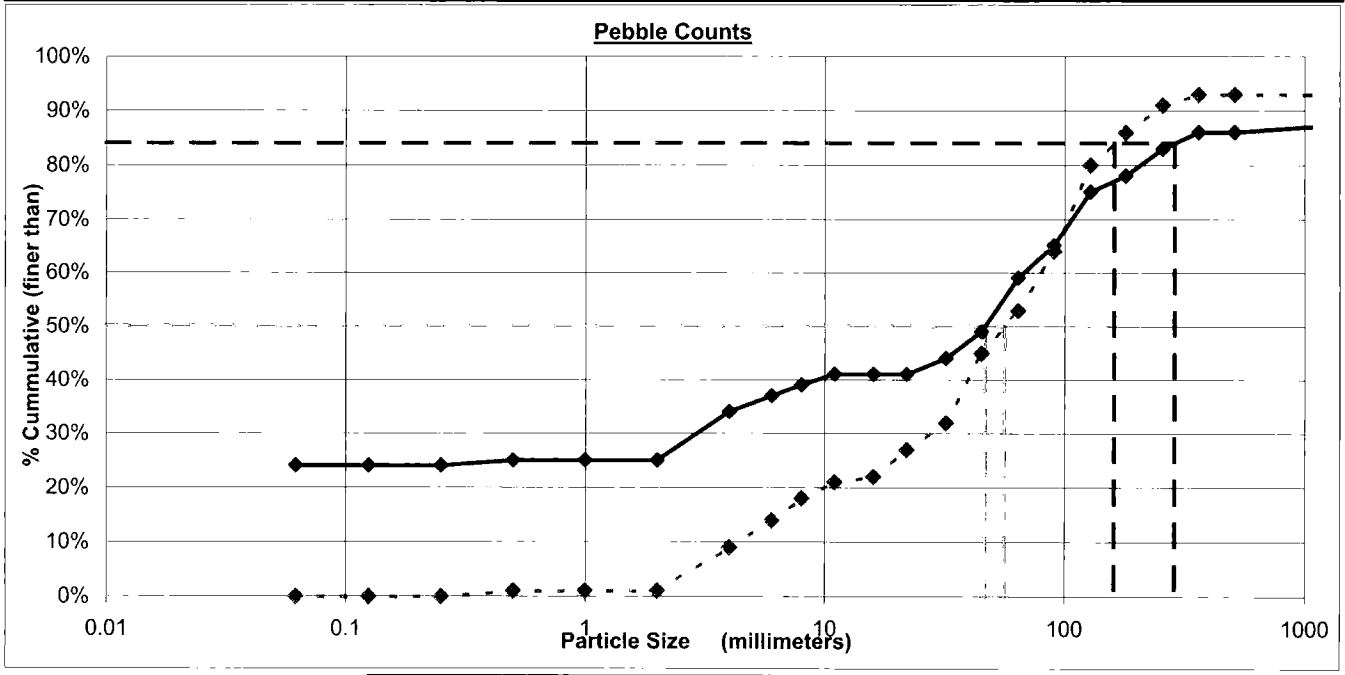
SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☒ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☒ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: Austerlitz KY Quadrangle, 1:24000 scale.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Clark County, Kentucky.
☒ National wetlands inventory map(s). Cite name: Austerlitz KY NWI.
☐ State/Local wetland inventory map(s): .
☒ FEMA/FIRM maps: Clark County, KY FIRM, dated 1986.
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): Aerial of project site, no date given.
or ☒ Other (Name & Date): Photos taken at during assessment, see assessment sheet for date.
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

Appendix 3

Pebble Count Town Branch: Tributary to Strodes Creek, Upstream Sample				Crew: Julie Clark, Rob Lewis, Jonathan Sheibly RUN30%/RIFFLE30%/POOL40%				Date:1-NOV-07		
PARTICLE	*Millimeters*		Classification Count	TOT #	ITEM %	% CUM	Active Channel Count	TOT #	ITEM %	% CUM
Silt/Clay	< 0.062	S/C		24	0.24	24.0%		0	0.00	0.0%
Very Fine	0.062 - 0.125	SAND		0	0.00	24.0%		0	0.00	0.0%
Fine	0.125 - 0.25			0	0.00	24.0%		0	0.00	0.0%
Medium	0.25 - 0.5			1	0.01	25.0%		1	0.01	1.0%
Coarse	0.5 - 1			0	0.00	25.0%		0	0.00	1.0%
Very Coarse	1 - 2			0	0.00	25.0%		0	0.00	1.0%
Very Fine	2 - 4	GRAVEL		9	0.09	34.0%		8	0.08	9.0%
Fine	4 - 6			3	0.03	37.0%		5	0.05	14.0%
Fine	6 - 8			2	0.02	39.0%		4	0.04	18.0%
Medium	8 - 11			2	0.02	41.0%		3	0.03	21.0%
Medium	11 - 16			0	0.00	41.0%		1	0.01	22.0%
Coarse	16 - 22			0	0.00	41.0%		5	0.05	27.0%
Coarse	22 - 32			3	0.03	44.0%		5	0.05	32.0%
Very Coarse	32 - 45			5	0.05	49.0%		13	0.13	45.0%
Very Coarse	45 - 64			10	0.10	59.0%		8	0.08	53.0%
Small	64 - 90	COBBLE		6	0.06	65.0%		11	0.11	64.0%
Small	90 - 128			10	0.10	75.0%		16	0.16	80.0%
Large	128 - 180			3	0.03	78.0%		6	0.06	86.0%
Large	180 - 256			5	0.05	83.0%		5	0.05	91.0%
Small	256 - 362	BOULDER		3	0.03	86.0%		2	0.02	93.0%
Small	362 - 512			0	0.00	86.0%		0	0.00	93.0%
Medium	512 - 1024			1	0.01	87.0%		0	0.00	93.0%
Large-Vry Large	1024 - 2048			0	0.00	87.0%		0	0.00	93.0%
Bedrock	2048 - 4096	BDRK		13	0.13	100.0%		7	0.07	100.0%
			TOTALS ⇨	100	100%		TOTALS ⇨	100	100%	



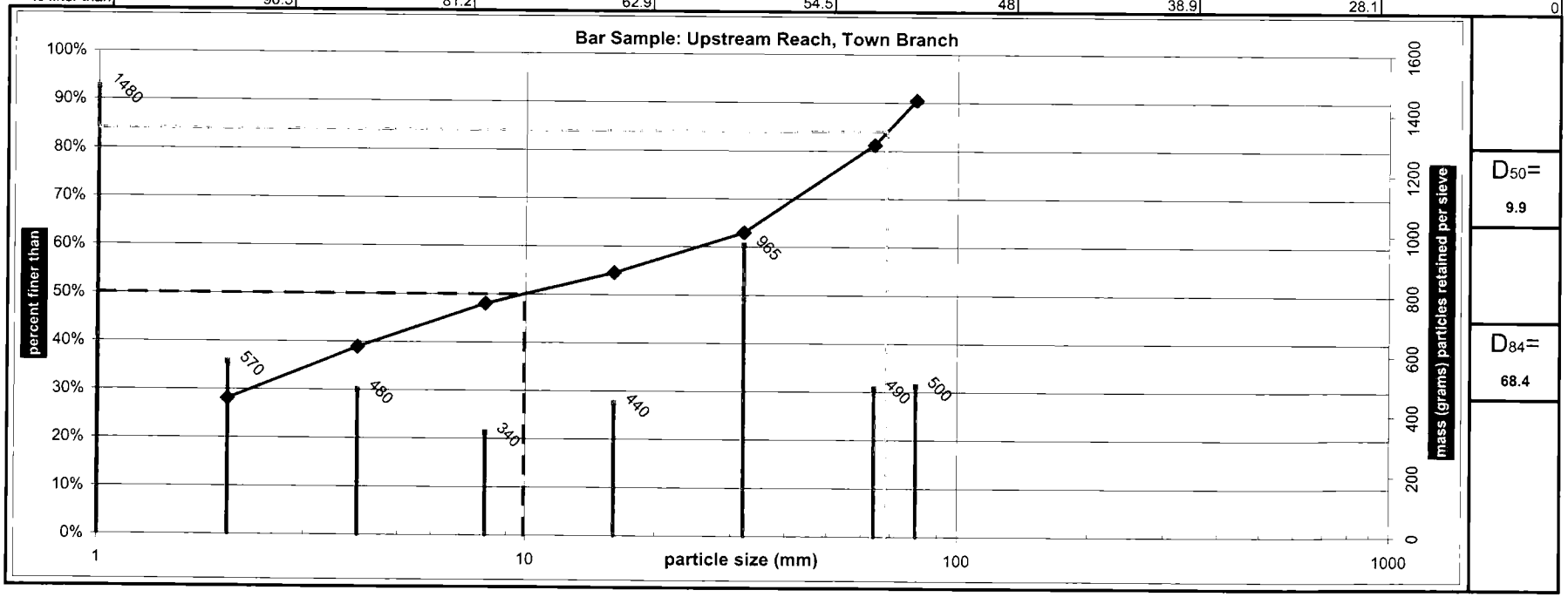
Classification	Classification D_{50}	46.6 mm	Classification D_{84} 287.3 mm
Active Channel	Active Channel D_{50}	56.1 mm	Active Channel D_{84} 160.7 mm

Appendix 3

Point / Side Bar Bulk Material Sample Data: Size Distrubution Analysis

Town Branch: Tributary to Strodes Creek, Upstream Sample | Date: 1-NOV-07 | Crew: Julie Clark, Rob Lewis, Jonathan Sheibly

SUBSAMPLES	Sieve Size (mm)		Sieve Size (mm)		Largest Particle(mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)	
	80		64		32		16		8		4		2		Pan / Bucket	
	Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)	
	0		1300		1365		1390		1330		1280		1235		870	
	Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights	
	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net
1	0	500	1790	490	2330	965	1830	440	1670	340	1760	480	1805	570	2350	1480
2		0	0	0		0				0		0		0		0
3		0		0		0		0		0		0		0		0
4		0		0		0		0		0		0		0		0
5		0		0		0		0		0		0		0		0
6		0		0		0		0		0		0		0		0
7		0		0		0		0		0		0		0		0
8		0		0		0		0		0		0		0		0
9				0		0		0		0		0		0		0
Add 2nd surface particle:		mm		0												
Net Wt. Total		500		490		965		440		340		480		570		1480
% Grand Total		9.5		9.3		18.3		8.4		6.5		9.1		10.8		28.1
% finer than		90.5		81.2		62.9		54.5		48		38.9		28.1		0



Appendix 3

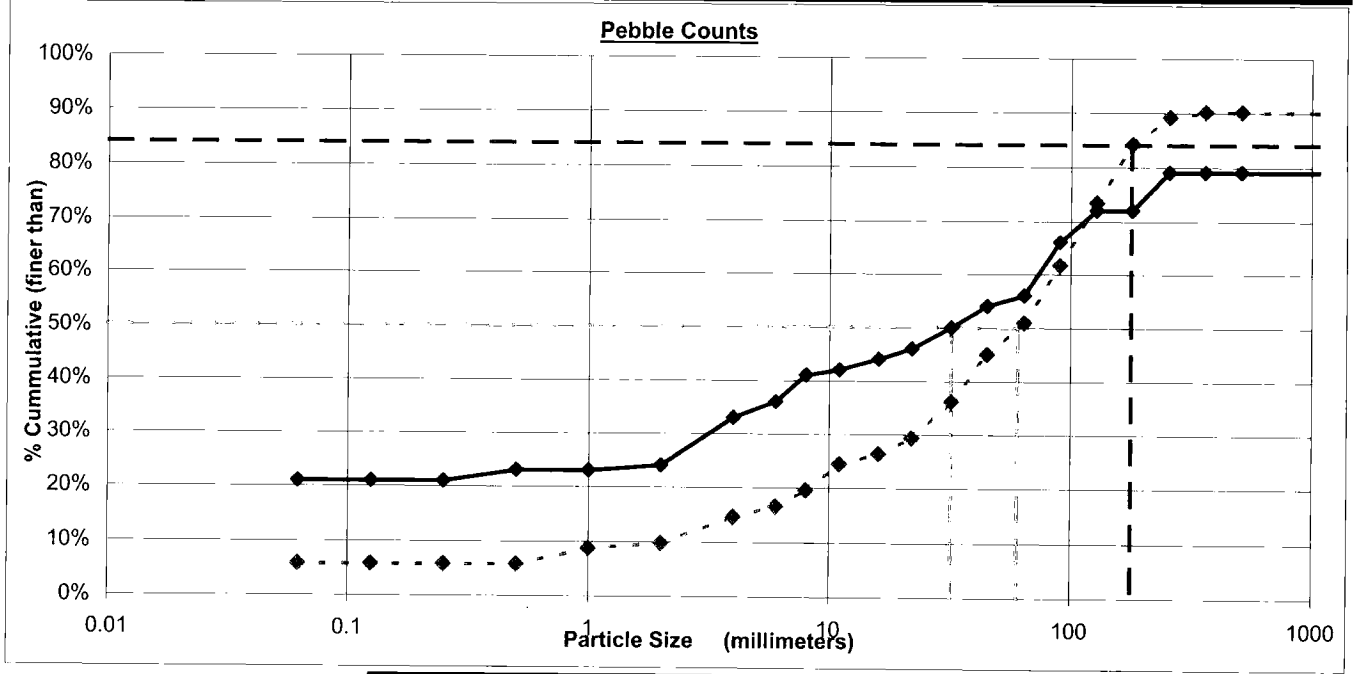
Pebble Count

Town Branch: Tributary to Strodes Creek, Downstream Sample

Crew: Julie Clark, Rob Lewis, Jonathan Sheibly
RUN40%/RIFFLE20%/POOL40%

Date:1-NOV-07

PARTICLE	Millimeters		Classification Count	TOT #	ITEM %	% CUM	Active Channel Count	TOT #	ITEM %	% CUM
Silt/Clay	< 0.062	S/C		21	0.21	21.0%		6	0.06	5.9%
Very Fine	0.062 - 0.125	SAND		0	0.00	21.0%		0	0.00	5.9%
Fine	0.125 - 0.25			0	0.00	21.0%		0	0.00	5.9%
Medium	0.25 - 0.5			2	0.02	23.0%		0	0.00	5.9%
Coarse	0.5 - 1			0	0.00	23.0%		3	0.03	8.8%
Very Coarse	1 - 2			1	0.01	24.0%		1	0.01	9.8%
Very Fine	2 - 4	GRAVEL		9	0.09	33.0%		5	0.05	14.7%
Fine	4 - 6			3	0.03	36.0%		2	0.02	16.7%
Fine	6 - 8			5	0.05	41.0%		3	0.03	19.6%
Medium	8 - 11			1	0.01	42.0%		5	0.05	24.5%
Medium	11 - 16			2	0.02	44.0%		2	0.02	26.5%
Coarse	16 - 22			2	0.02	46.0%		3	0.03	29.4%
Coarse	22 - 32			4	0.04	50.0%		7	0.07	36.3%
Very Coarse	32 - 45			4	0.04	54.0%		9	0.09	45.1%
Very Coarse	45 - 64			2	0.02	56.0%		6	0.06	51.0%
Small	64 - 90	COBBLE		10	0.10	66.0%		11	0.11	61.8%
Small	90 - 128			6	0.06	72.0%		12	0.12	73.5%
Large	128 - 180			0	0.00	72.0%		11	0.11	84.3%
Large	180 - 256			7	0.07	79.0%		5	0.05	89.2%
Small	256 - 362	BOULDER		0	0.00	79.0%		1	0.01	90.2%
Small	362 - 512			0	0.00	79.0%		0	0.00	90.2%
Medium	512 - 1024			0	0.00	79.0%		0	0.00	90.2%
Large-Vry Large	1024 - 2048			0	0.00	79.0%		0	0.00	90.2%
Bedrock	2048 - 4096	BDRK		21	0.21	100.0%		10	0.10	100.0%
			TOTALS	100	100%		TOTALS	102	100%	



Classification ◆——◆ **Classification D_{50} 32.0 mm** **Classification D_{84} 2415.5 mm**

Active Channel ◆- - - -◆ **Active Channel D_{50} 60.4 mm** **Active Channel D_{84} 178.2 mm**

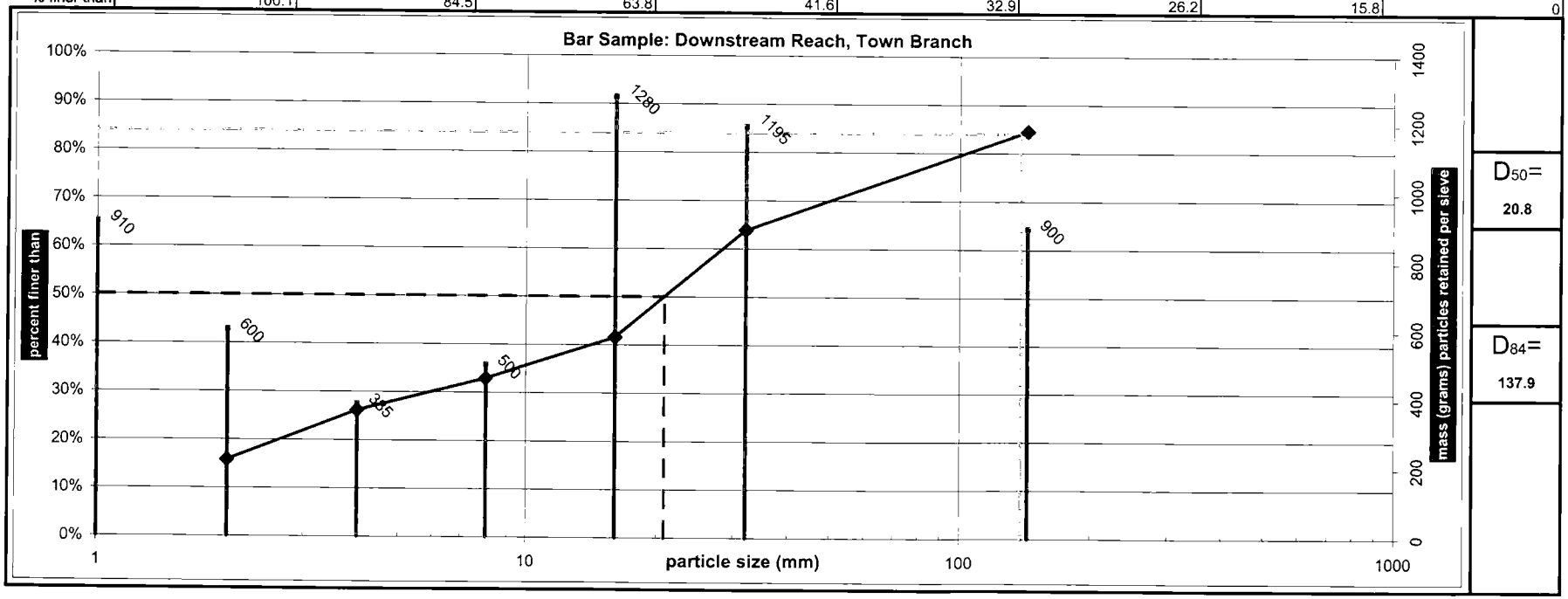
Appendix 3

Point / Side Bar Bulk Material Sample Data: Size Distrubution Analysis

Town Branch: Tributary to Strodes Creek, Downstream Sample | Date: 1-NOV-07 | Crew: Julie Clark, Rob Lewis, Jonathan Sheibly

SUBSAMPLES

	Sieve Size (mm)		Sieve Size (mm)		Largest Particle(mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)		Sieve Size (mm)	
	0		143		32		16		8		4		2		Pan / Bucket	
	Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)		Tare Weight (g)	
	0		0		1365		1390		1330		1280		1235		870	
	Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights		Sample Weights	
	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net
1	0		0	900	2560	1195	2670	1280	1830	500	1665	385	1835	600	1780	910
2		0	0	0		0				0		0		0		0
3		0		0		0		0		0		0		0		0
4		0		0		0		0		0		0		0		0
5		0		0		0		0		0		0		0		0
6		0		0		0		0		0		0		0		0
7		0		0		0		0		0		0		0		0
8		0		0		0		0		0		0		0		0
9						0		0		0		0		0		0
Add 2nd surface particle: 143 mm				0												
Net Wt. Total		0		900		1195		1280		500		385		600		910
% Grand Total		0		15.6		20.7		22.2		8.7		6.7		10.4		15.8
% finer than		100.1		84.5		63.8		41.6		32.9		26.2		15.8		0



Appendix 4. Trees and shrubs to be planted.

There are three planting zones identified for this project. Descriptions and a **list of suggested species** for each planting zone are as follows:

Zone 1: Riparian Corridor

This zone covers the majority of the project site. Trees, shrubs, and a herbaceous mix will be planted. Generally shrubs shall be interspersed within the trees. However, black willow shall be used only along streambanks, concentrated at outside bends for bank stability.

Herbaceous Mix
Agalinus purpurea
Andropogon gerardii
Aster novae-angliae
Bidens aristosa
Carex lurida
Dichanthelium clandestinum
Echinochloa crus-galli
Elymus virginicus
Eupatorium perfoliatum
Helianthus tuberosus
Juncus diffusisimus
Panicum dichotomum
Panicum rigidulum
Scirpus atrovirens

Trees/Shrubs
Quercus imbricaria (shingle oak)
Quercus shumardii (shumard oak)
Quercus prinus (pin oak)
Quercus bicolor (swamp white oak)
Quercus pagoda (cherrybark oak)
Carya laciniosa (shellbark hickory)
Cornus drummondii (rough-leaf dogwood)
Salix nigra (black willow)
Euonymus americanus (strawberry bush)
Viburnum dentatum (arrow wood)

Zone 2: Low Areas

Low areas occur within the riparian corridor near the existing channel and will be defined onsite following construction. Trees, shrubs, and a herbaceous mix conducive to wetter conditions will be planted.

Herbaceous Mix
Alisma subcordatum
Asclepias incarnata
Carex squarrosa
Carex vulpinoidea
Elymus virginicus
Glyceria striata
Leersia oryzoides
Ludwigia alternifolia
Mimulus ringens
Potamogeton nodosus
Sagittaria latifolia
Saururus cernuus
Scirpus validus
Sparganium americanum

Trees/Shrubs
Quercus shumardii (shumard oak)
Quercus prinus (pin oak)
Quercus bicolor (swamp white oak)
Quercus pagoda (cherrybark oak)
Quercus michauxii (swamp chestnut oak)
Carya laciniosa (shellbark hickory)
Euonymus americanus (strawberry bush)
Ilex verticillata (winterberry holly)
Viburnum dentatum (arrow wood)

Zone 3: 20-foot Wide Sanitary Sewer Corridor

For maintenance considerations, a zone of only herbaceous vegetation and a few shrubs is proposed for the existing sewer corridor. In addition, there will be short points of access to the sewer corridor that will be void of trees.

Herbaceous Mix
Agalinus purpurea
Andropogon gerardii
Aster novae-angliae
Bidens aristosa
Carex lurida
Dichanthelium clandestinum
Echinochloa crus-galli
Elymus virginicus
Eupatorium perfoliatum
Helianthus tuberosus
Juncus diffusisimus
Panicum dichotomum
Panicum rigidulum
Scirpus atrovirens

Shrubs
Euonymus americanus (strawberry bush)
Viburnum dentatum (arrow wood)

Trees, shrubs and herbaceous mixes will be distributed onsite at planting and seeding rates as described in the tables that follow.

Planting requirements for Forested portion of Riparian Mitigation

	RPM* tree's
Planting rate	60 2-3 gallon containers/acre
Percentage for one species at initial planting	No one species may make up more than 20% of initial planting (min 5 spp)
Monitoring Period	5 years**
Percentage for one species at final count	No one species may make up more than 25% of final surviving stock
Survival Requirement	90% of initial stock***

Planting requirements for Scrub/Shrub component of Riparian Mitigation

	RPM* tree's
Planting rate	60 2-3 gallon containers/acre
Percentage for one species at initial planting	No one species may make up more than 33% of initial planting (min 3 spp)
Monitoring Period	5 years**
Percentage for one species at final count	No one species may make up more than 40% of final surviving stock
Survival Requirement	90% of initial stock***

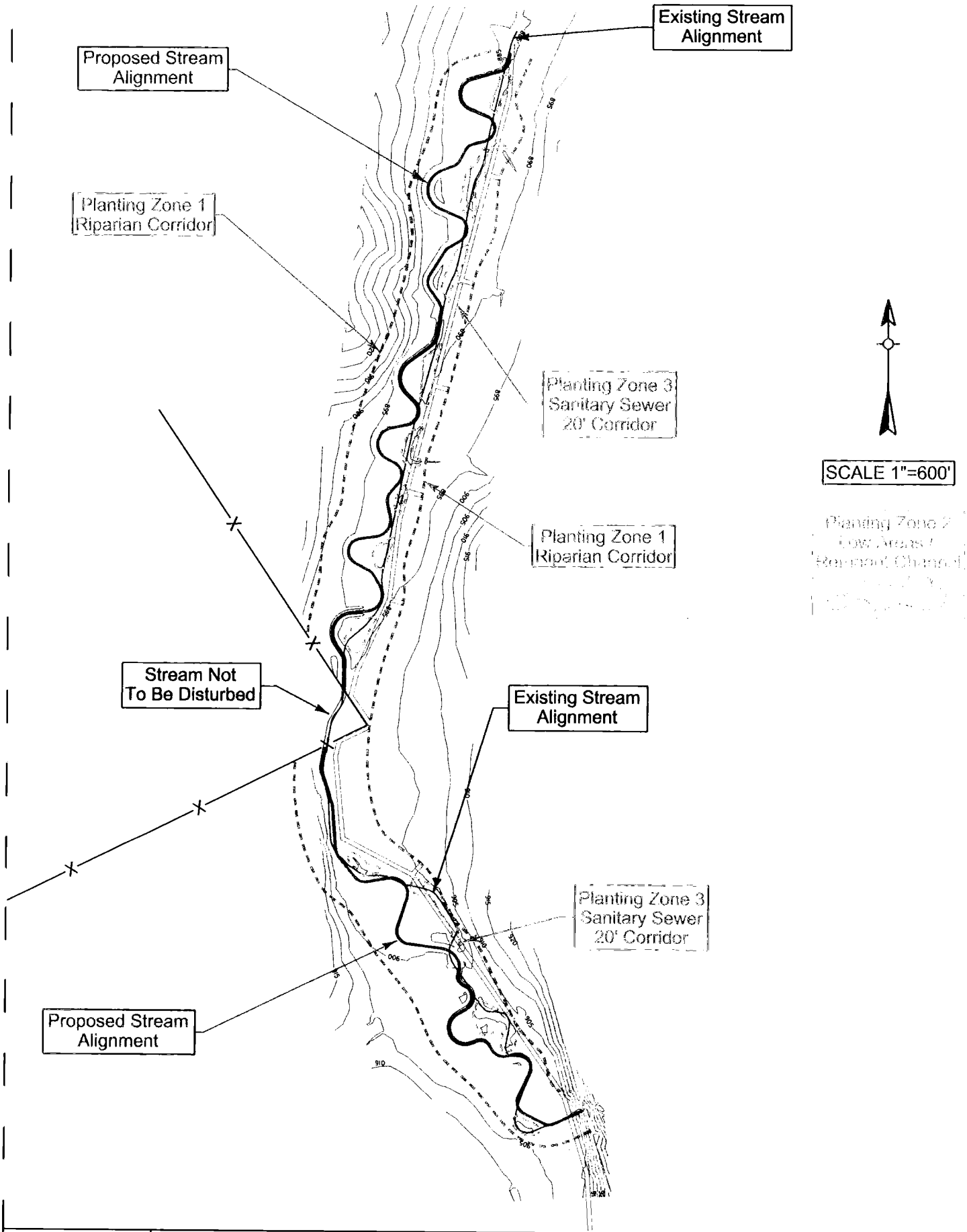
* RPM – Root Production Method- root system through a multi-step program of air-root pruning.
** Length of monitoring period is conditioned on project success and Corps release.
***Volunteer species may not be counted to this requirement.

Planting requirements for Herbaceous component of Riparian Mitigation

Planting Rate	Broadcast or transplant to be determined by individual permit review.
Species per acre	Minimum of five species
Monitoring Period	5 years**
Ground Cover Requirement	Planted species must account for 70% ground cover at the end of monitoring
Ground Cover for individual species	No one species may comprise more than 40% of the final cover

** Length of monitoring period is conditioned on project success and Corps release.

Town Branch Restoration Project



T.H.E. Engineers, Inc.	Project: Town Branch Restoration Project			Planting Zones	
	COUNTY: Clark	STATE: KENTUCKY	NEAR: Winchester, Ky.	Contour Map	Appendix 4 Exhibit

Appendix 5. Stream success criteria.

Category	Criteria	Initial Design Value	Year 1	Year 2	Year 3	Year 4	Year 5
Geomorphology	**Pattern, profile, and dimension**	See Proposed Values in Table 1	Values in pattern, profile, and dimension do not vary significantly (a) from design expectations and assumptions and (b) to an extent that instability and/or a change in stream type of designed reaches occurs as determined through the interim and final as-built surveys.				
	Short-term Instability	Minimal unstable areas on stream bank or within stream	Stream banks, channels, and substrate do not show any significant or unanticipated erosion or deposition problems (e.g., sloughing banks, head cuts, depositional bars) as documented through annual site inspections of all restored stream reaches and associated photographs or video.				
Habitat	**EPA RBP Scores**	**<155**	**<155**	**<155**	**~155**	**~155**	**155+**
Vegetation	**Planted RPM trees:** *% survival by plot* *# survival by plot* *maximum % 1 species* *minimum # species*	100% 60 <20% 5	>90% >54 <20% 5	>90% >54 <20% 5	>90% >54 <25% 5	>90% >54 <25% 5	>90% >54 <25% 5
	Planted RPM shrubs: *% survival by plot* *# survival by plot* *maximum % 1 species* *minimum # species*	100% 60 <33% 2	>90% >54 <33% 2	>90% >54 <33% 2	>90% >54 <40% 2	>90% >54 <40% 2	>90% >54 <40% 2
	Non-native Trees: *maximum % by plot*	<5%	<5%	<5%	<5%	<5%	<5%
	Species List By Plot	yes	yes	yes	yes	yes	yes

Appendix 6. Estimated stream credits.

Pre-project

Stream Reach	Stream Type	RBP Score	Initial Quality	Impact Length	Ratio Used	Debit Amount
Town Br.	P	101 (ave.)	Poor	5862	1.5	8793
Totals				5862		8793

Post-project

Stream Reach	Stream Type	RBP Score	Final Quality*	Design Length	Ratio Used	Credit Amount
Town Br.	P	155+	Excellent	7054	3	21162
Totals				7054		21162

NET STREAM CREDITS = 21162 (credit value derived from restored stream channel) – 8793 (credit value of existing streams) **= 12369 CREDITS**